LNO

LON NUTZER ORGANISATION e.V.

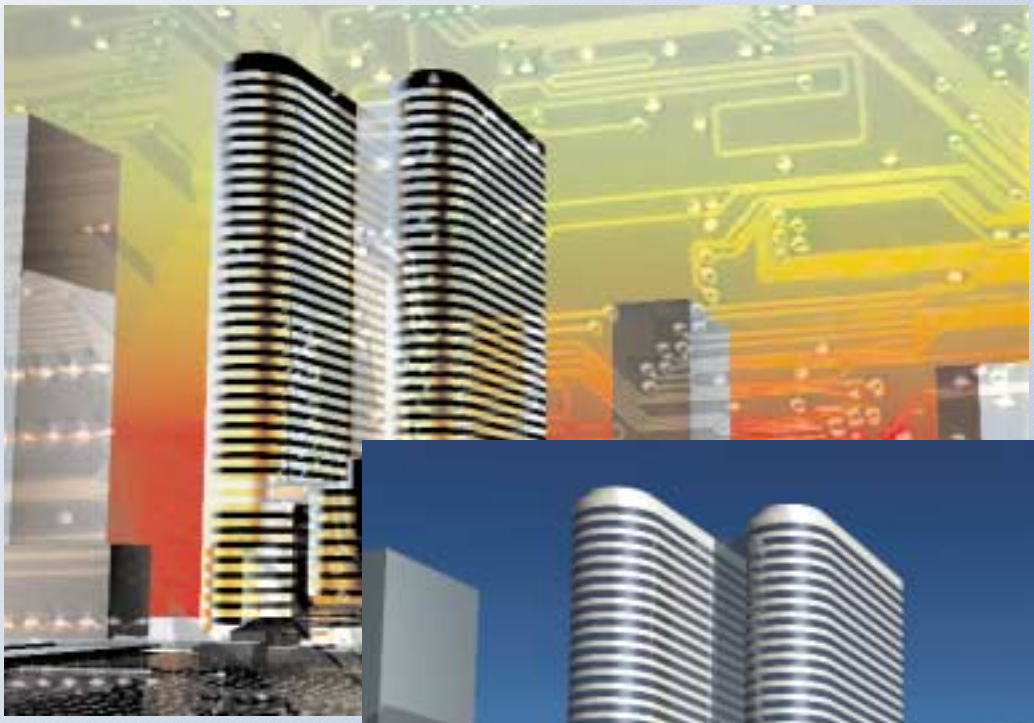
BRIEF

Nº 1

April 2001

LONWORKS around Europe

European edition



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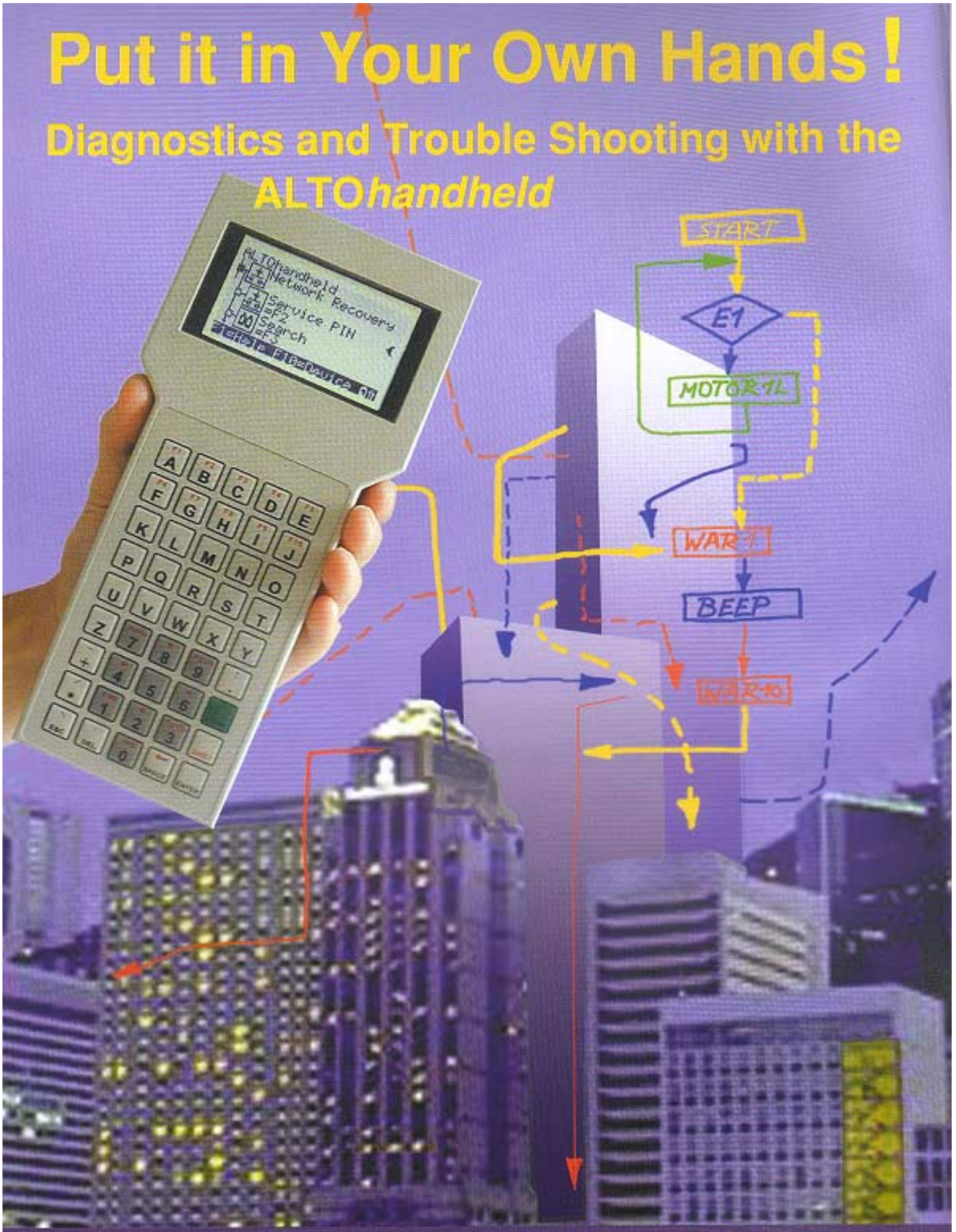

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Editorial

Objectives of the LNO Brief European Edition

Dear reader,

In your hands you hold the first European Edition of the LNO Brief. It stands as a major milestone in the development of the LNO (LON Nutzer Organisation e.V. / LON User Organisation) which, until today, has operated predominantly within the German speaking territories and exclusively in the German language. All of our approximate 150 members – with a few exceptions from Eastern Europe - have their residence or centre of business in Germany. For these members, the LNO Brief has been the major vehicle of communication: communication about their activities, their products, as well as their applications and successes in the marketplace. So far, the LNO has published 22 issues of the LNO Brief. It has become a regular source of information for an ever-widening group of LONWORKS fans. With its more than 8,000 printed copies per issue, it has become a "bright lighthouse" for LONWORKS-based open, interoperable systems in a "dark world" of proprietary solutions.

Wilhelm Schluckebier

Over the years, we at the LNO have received enormously positive and constructive feedback from many individuals and companies from non-German speaking countries. Apparently, some got out their school books and German dictionaries to study the various articles and advertisements. Others simply recognised a name and picked up the phone or wrote an e-mail. At any rate, the LNO Brief started to become circulated outside of Germany in sizable numbers.

In the past, there have been several attempts by the LNO and other European User Organisations to exchange information and work together on international events such as LONWORLD™, the Open Systems Roadshow or tradeshows like the Hanover Industrial Fair. The main objective has been to create business partnerships between LNO members and companies from other European countries. In a few cases this has worked extremely well. A notable example is the pan-European "Infranet Partners" group which functions like a virtual European company when it comes to the exchange of products, engineering capacity and know-how. In the majority of cases, however, it has proven extremely difficult to cross the "cultural line" into another European country. As we all know, probably the biggest obstacle in that direction is communication and language.

Jürgen Hertel

This is the reason why the Board of the LNO decided to publish a European Edition of the LNO Brief in the English language. In 2001, the plans are to have two issues, this one for the Hanover Industrial Show HMI2001, and a second one for LONWORLD™ 2001 in October. Our expectations are threefold: first, we expect our members to try out English-language advertising in order to attract the interest of foreign customers to their respective home pages. Second, we want to attract European companies to find German customers for their products. And third, we would like to hand out an attractive piece of collateral to the many international visitors to Hanover from Europe and abroad which will give them some food for reading and thinking when they return home. This is clearly an experiment and we would appreciate your written comments and feedback regarding this issue (info@tema.de) in order to improve our autumn issue.

Dieter Schunk

We would also like to address some concerns that people may voice upon reading this first European Edition. The LNO, as an organisation, does not intend to play a dominating role within the European User Groups. Quite the contrary, we feel that we must overcome our "isolation" caused by a language which is spoken by about 100 million people but is NOT spoken by about 300 million people in Europe. In a year where we are approaching the day when we all will have one common European currency, this seems an appropriate step to take.

We sincerely hope you will enjoy reading this issue, and extend our best wishes to all of you out there in Europe who share our idealism and ambition for a world of open LONWORKS systems with many challenges and business opportunities yet to be uncovered.

Wilhelm Schluckebier
Dieter Schunk
Jürgen Hertel
(Board of the LNO)

About the cover picture

In La Défense, the technological heart of Paris, twin towers together with three other buildings, form the Coeur Défense complex of offices, shops, cafeterias and conference centre. Offering 160,000m² of office space, the complex has a multi-functional and cost-effective Building Management System thanks to the integration of 15,000 interconnected devices interoperating across a LonWorks network. Among them are over 8,000 fan coil regulators for heating and cooling from Siemens Landis & Staefa Division and over 4,000 Philips 8-way lighting controllers serving 32,000 luminaires. The 350 million Euro project, begun in 1998, offers a prestigious site for businesses. Now with LonWorks providing a fully automated

Impressum

The LNO Brief is a publication of the LNO - LON Nutzer Organisation e.V. (LON User Organisation).

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(Continuation of impressum: p.14)

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In this issue you will find...

Editorial 3

Introduction to LonWorks technology

LonWorks Essentials for the Novice Reader 6
LonWorks casts its "net" to industrial applications 10
What is the LNO? 12
LonWorks in Industrial Control 15
Interview with Henk Walraven 20
The LonMark Interoperability Association 22

Reference Projects

Sanacorp Pharmahandel AG Project, Ulm, Germany 24
New Depfa Bank Building Project 25
Rudolph Diesel School Project, Waldkraiburg, Germany 26
LonWorks in Bratislava Bank 27
Door Management System 29
Central Seine Building – Van Gogh 30
Maersk Data's new headquarters 31
Helsinki story: LON connection of churches 32
Heavenly Building Technology 34
LonMark Around Europe 36

Applications and Products

DRAKALON®: The No. 1 cabling system for LonWorks Networks 41
GLOBE 2000 42
Motor driven valve actuator - The economic solution 43
New dimension in room management 45
Gipsy Makes Buildings Communicate 47
Diagnosis Tool Detects Any Problem within LON Network 48
Weather station and blind actuators 49
Double actuator for sunblinds / awnings 49
New telecontrol module for long-distance data transmission 52
Airflow Machines from THEN GmbH shipping worldwide 53
LON Multisensor: Multiarcon 55
Put it in Your Own Hands! 56
Training for system integrators, installers, operators and consultants . 59
SysMik and Honeywell agreement 59
A toolset for stress test in field bus systems 60
Membership List 66
Membership Request Form 72
Fax-Antwort 73
Fairs and Events 74

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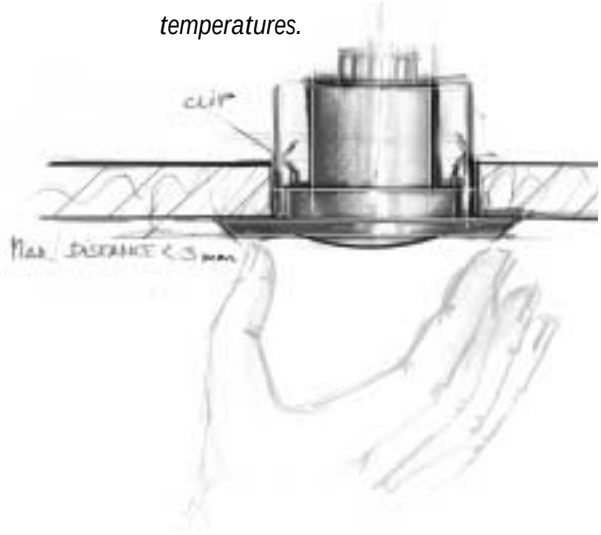

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LonWorks Essentials for the Novice Reader

This article is yet another piece in an enormous effort to build an open world of controls. Ideally, at the end of the road, all technical devices of this world would be able to communicate in one common language. Just as English has become the global language for science and technology, LonWorks – invented and designed by Echelon Corporation in California - is steadily growing to become the global standard of open systems in CONTROL.

With thousands of application developers and millions of devices installed worldwide, the LonWorks system is the leading open solution for building and home automation, industrial, transportation, and public utility control networks. A **control network** is any group of devices working in a peer-to-peer fashion to monitor sensors, control actuators, communicate reliably, manage network operation, and provide complete access to network data. A LonWorks network uses the LonWorks protocol, also known as the ANSI/EIA 709.1 Control Networking Standard, to accomplish these tasks.

The LonWorks system is based on the following concepts:

- Control systems have many common requirements regardless of application.
- A networked control system is significantly more powerful, flexible, and scalable than a non-networked control system.
- Businesses can save and be more profitable with control networks over the long-term than they can with non-networked control systems.

In some ways, a LonWorks network resembles a computer data network, referred to as a Local Area Network, or LAN. Data networks consist of computers attached to various communication media, connected by routers, which communicate with one another, using a common protocol such as TCP/IP. Data networks are optimised for moving large amounts of data, and the design of data network protocols assumes that occasional delays in data delivery and response are acceptable. Control networks contain similar pieces optimised for the cost, performance, size, and response requirements of control. Control networks allow networked systems to extend into a class of applications that data networking technology cannot reach. Manufacturers of control systems and devices are able to considerably shorten their development and engineering time by designing LonWorks components into their products. The result is a cost-effective development and a consistency that allows devices from multiple manufacturers to be able to communicate.

LonWorks networks range in sophistication from small networks embedded in machines to large networks with thousands of devices controlling fusion lasers, paper manufacturing machines, and building automation systems. LonWorks networks are used in buildings, trains, aeroplanes, factories, and hundreds of other processes. Manufacturers are using open, off-the-shelf chips, operating systems, and parts to build products that feature improved reliability, flexibility, system cost, and performance.

Traditional control networks use closed islands of control linked with proprietary gateways. These gateways are difficult to install and maintain, and lock the customer into a closed, non-interoperable architecture. Ultimately, the high cost of this design approach has limited the market for control systems. The LonWorks system is accelerating the trend away from these proprietary control schemes and centralised systems by providing interoperability, robust technology, faster development, and scale economies. Distributing the processing throughout the network and providing open access to every device, lowers the overall installation and life cycle costs, increases reliability by minimising single point of failure, and providing the flexibility to adapt the system to a wide variety of applications. For example, in the building control industry, LonWorks networks are used to provide a common infrastructure for all building systems like HVAC, electrical installation, lighting, security, access control, room control, etc. This allows the building automation system designer to eliminate excessive vertical integration, which is often the reason for vertical isolation.

The benefits of the LonWorks-enabled flat control architecture for the end-user or system integrator are as follows:

- a wide variety of compatible, cost-effective LonWorks devices available from multiple vendors within Europe and world-wide
- a variety of easy-to-use HMI and network-management tools from multiple vendors
- greatly reduced wiring costs
- short system design cycle; no custom hardware or programming
- greater system reliability; no single point of failure
- multi-vendor system maintenance options, and
- ease of implementing new functions to meet end-user needs

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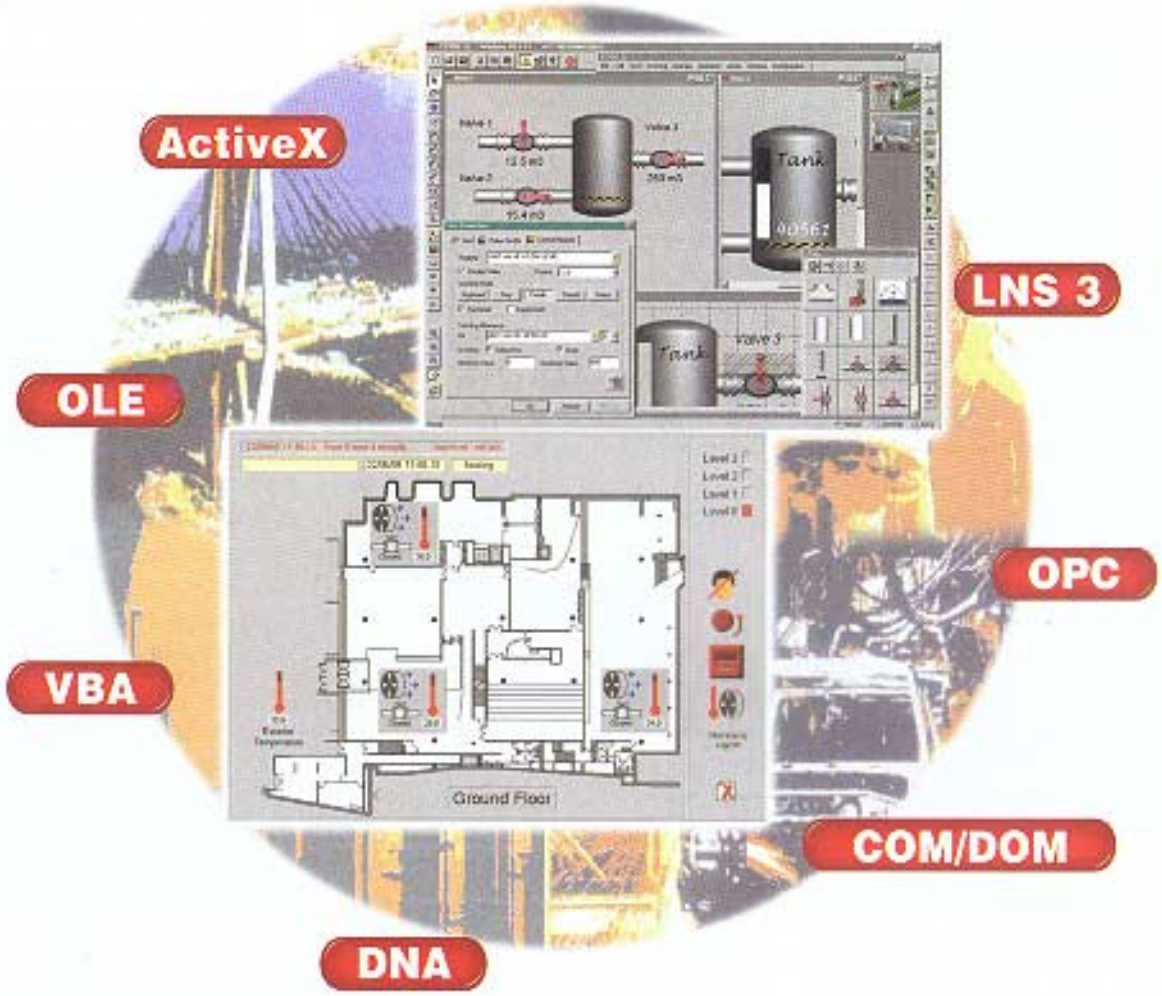

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The LONWORKS technology is comprised of three major elements:

- Neuron® Chip control processors and transceivers – the hardware components used in LONWORKS devices
- The LONWORKS communication protocol – permanently embedded in each LONWORKS device; and
- LONWORKS Network Services (LNS) – the basis for easy-to-use, interoperable network management and HMI tools.

In addition, Echelon and other manufacturers provide a comprehensive set of design and development tools for LONWORKS devices and networks. The physical core of every LONWORKS device is a Neuron Chip control processor, a system-on-a-chip with multiple microprocessors, read-write and read-only memory (RAM and ROM), communication and I/O interface ports. The read-only memory contains an operating system, the LONWORKS communication protocol, and an I/O function library. The chip has non-volatile RAM for configuration data and for the application program, both of which are downloaded over the communication network. At the time of manufacture, each Neuron Chip is given a permanent unique-in-all-the–world 48-bit code, called the Neuron ID. A large family of Neuron Chips is available with different speeds, memory type and capacity, and interfaces. The Neuron Chips are jointly designed by Echelon and its semiconductor partners, TOSHIBA and CYPRESS. Over 13 Million Neuron Chips were shipped by the end of 2000, with prices at less than $3 for some versions purchsed in bulk.

A Transceiver is an electronic module that provides the physical interface between the communication port of the Neuron Chip and a physical

Fig. 1 The Neuron® Chip microcontroller – the heart of distributed intelligence

medium, called a channel**,** which transports the digital communication packets to other devices. All devices connected to a specific channel must have compatible transceivers running at the same bit rate. Transceivers are available from Echelon and other manufacturers for a variety of media, including single twisted pair, power line, RF, infrared, fibre optics, and coax. Bit rates depend on the media and transceiver design; up to 1.25 Mbps can be achieved on a single twisted pair. LONWORKS systems may have multiple channels of the same or different types of media; channels are connected by LONWORKS routers**.**

The LONWORKS communications protocol is a layered, packet-based, serial peer-to-peer communications protocol. Like the related Ethernet and Internet protocols, it is open and adheres to the layered architectural requirements of the International Standards Organisation (ISO), but the LONWORKS protocol is designed for the specific requirements of control systems, rather than data processing systems. The LONWORKS protocol has been fully published as a document and carries the designation ANSI/ EIA 709.1 protocol. A C- implementation of the protocol is downloadable from Echelon's web site. As such, it has been implemented on other Micro-controllers like a 32 bit RISC processor and the Intel Pentium III in order to achieve the reach of the protocol to Ethernet and the Internet. Unlike many other communication protocols, it is designed to be media-independent, allowing LONWORKS systems to communicate over any physical transport media. The program implementation of the protocol is contained as ROM firmware in every Neuron Chip; the protocol provides for a number of modifiable configuration parameters to make trade-offs in performance, security, and reliability for a particular application.

LONWORKS Networks Services (LNS) is a Network Operating System featuring a client-server architecture and a network object hierarchy that provides the foundation for interoperable LONWORKS networks tools and applications. It enables component-based software design of a new generation of tools and SCADA / HMI applications that can work together to install, maintain, monitor, and control LONWORKS networks. All applications – locally or remotely through the Internet – work with the same set of data and network structure information located in the LNS database. LNS also makes it easy to integrate control systems with other information systems. The architecture supports clients based on any platform; LNS 3

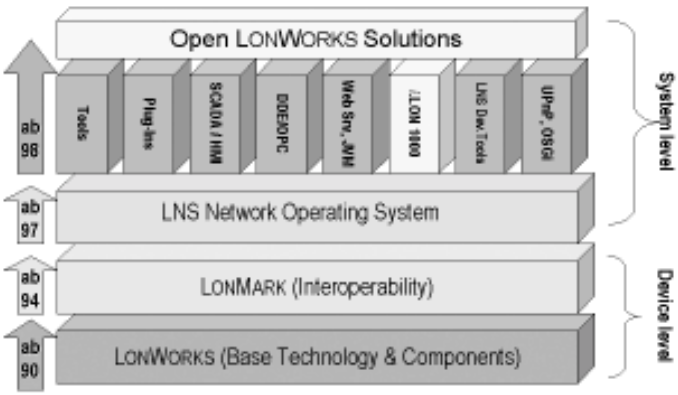

Fig. 2 The LONWORKS open systems layered architecture

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servers are currently based on Windows® NT and Windows 2000. In Fig. 2, LNS represents an interoperability layer on top of a LonWorks device network which allows the building of complete open LonWorks systems.
Today, Echelon as the leader of the LonWorks technology, manufactures and markets over 80 LonWorks products on a global scale to help developers, system integrators, and end-users implement LonWorks networks. These products provide a complete LonWorks solution including development tools, network management software like Echelon's LonMaker for Windows, the i.LON™ 1000 IP Server, power line and twisted pair transceivers and control modules, network interfaces, technical support and training.

Clearly, this article only scratches the surface of what LonWorks is and how it can work for YOU. For more information, please go to Echelon's home page, www.echelon.com, or to the LNO home page, www.lno.de, or send an e-mail to j.hertel@echelon.de for a book called "Introduction to LonWorks" by Prof. Tiersch, FH Erfurt (Technical University of Erfurt, Germany).

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LonWorks casts its "net" to industrial applications

The German LON Nutzer Organisation e.V. (LNO - LON User Organisation) is present at this year's Hanover Fair alongside 29 companies. The exhibitors will cover the complete range of LonWorks technology, with a particular focus on the theme "LonWorks in industry". The LON community will display its international colours with exhibitors not only from Germany, but also from other European countries and from overseas.

A large number of the exhibitors will document the importance that LonWorks has won in industry. The LNO and its Task Groups are working intensively on establishing LonWorks even further within industry. As a universal control network, LonWorks is now represented in almost all areas.

With the foundation of an Industry Task Group, the LNO has been able to keep abreast of changes with respect to the growing number of applications and the constantly increasing demand from industry over the past year. The Task Group will present itself for the first time to a larger audience at the Hanover Fair. During its presentation, the Group will specifically outline the possibilities and the benefits of implementing LonWorks.

The vistors to the joint LNO booth will be treated to a comprehensive and informative programme throughout the duration of the fair. Presentations will be held daily, incorporated into an entertaining framework of activities.

The LNO has played a leading role in the establishment of LonWorks technology in Europe. It is to the LNO's credit that Europe is one of the most important markets for LonWorks today. This will be clearly demonstrated at the LNO booth. It is not only German companies who will have the chance to present the complete range of possibilities with LonWorks technology, but also companies from France, Italy and the Netherlands. Among them are also the Infranet Partners, a Europe-wide consortium of companies who are active as service providers for LonWorks operators.

HANNOVER MESSE
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From the USA, the Echelon Corporation, developer of the LonWorks technology, will participate at the joint booth. Echelon will exhibit next to Toshiba. Also represented will be the LonMark Interoperability Association. This is an international Association of manufacturers, users and system integrators whose goal is to promote and maintain the Interoperability standard of LonWorks products and to develop and establish Interoperability Guidelines.

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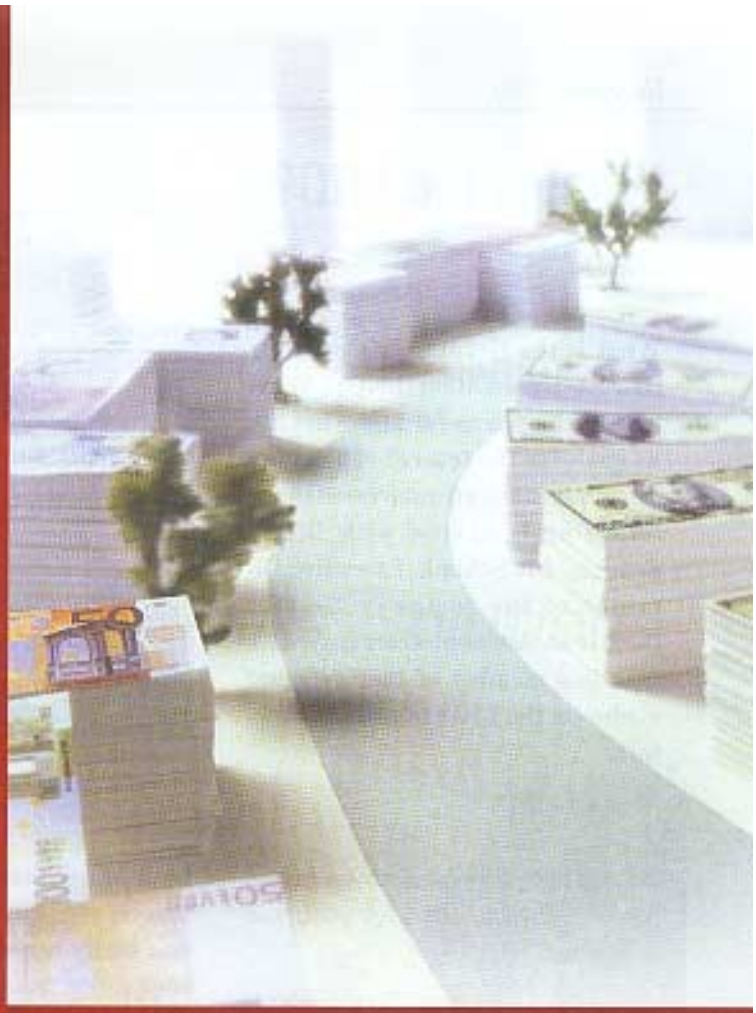

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What is the LNO?

What is the German LON Nutzer (Users) Organisation (LNO)? What has it achieved so far and what are its goals for the future? These and other questions are addressed in the following interview with Dieter Schunk. Mr Schunk, Executive Director of the company Gesytec GmbH in Aachen, Germany, is a founding member of the LNO and is also on the LNO Board of Directors.

Dieter Schunk, Vice-Chairman LNO

What is the LON Nutzer Organisation (LNO)? Why and with what goals was it founded?

The LNO, the German LON Users Organisation, was founded in 1993, that is, less than two years after the world-wide launch of LONWORKS. Its aim was to promote LONWORKS in Germany and Europe. The founders were aware that only by combining forces on the highly innovative German fieldbus scene could they gather the momentum necessary to face the competition from other fieldbuses driven by large affiliated groups such as Profibus, EIB and CAN.

What is the LNO's structure? How does it work?

The majority of the LNO's work is performed by the Task Groups who are appointed by the General Assembly. These Task Groups are overseen by the Technical Board and by the LNO Board of Directors.

What have been the LNO's main activities in the last 8 years? What has it so far achieved?

It all began with a strong concentration on publicity work. After all, it was firstly necessary to promote the completely unknown name, "LON", and the technology behind it. Since the time when LON finally achieved market penetration, approximately 4 years ago, more and more specialised Task Groups have formed. They deal with making LON applications even better and even more perfect. One can rightly contend that LON cannot be beaten for quality in the European fieldbus arena. LON is today the most globally widespread fieldbus in building automation and has been able, even in Germany, to hold its ground against EIB. The German LNO has contributed significantly to this success.

What will be the main activities in the near future?

Even LON and the LNO have to take into account that fieldbuses will disappear more and more and that we are moving towards a seamlessly networked world. The LNO will also support this trend, again through promotion and active technical work. Current hot topics are the intelligent house and LON in industry. These themes are being supported in our Task Groups with a high priority status. We will continue to put just as much energy into the spread of the technology. Two highly competent books about LON and the ever-expanding LNO Brief stand as a testimony to this.

What differentiates the LNO from similar organisations?

Unlike other user organisations, the LNO is not the representative of a mighty technology provider. The driving force of the LNO is its members. Their engagement is enormous and so is their degree of objectivity and ability for constructive criticism. These are important factors that allow a forum for productivity and discussion that brings the goal of promoting LON positively forward.

Who can become a member? What links the members of the LNO together?

LON is a technology that was invented for mass distribution. Anyone who deals with LON and feels committed to the LNO's aims can, as a consequence, become an LNO member. For good reason the LNO has a tiered system for contribution fees. This allows smaller companies and even individuals to become members, something that is reflected in the current membership structure where medium-sized companies form, by far, the majority.

What obligations does one accept as an LNO member? What value and advantages do members enjoy as a result of their contributions to the LNO?

Electronics for building control systems

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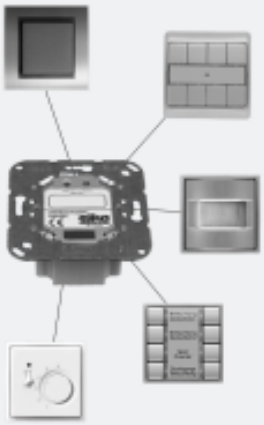

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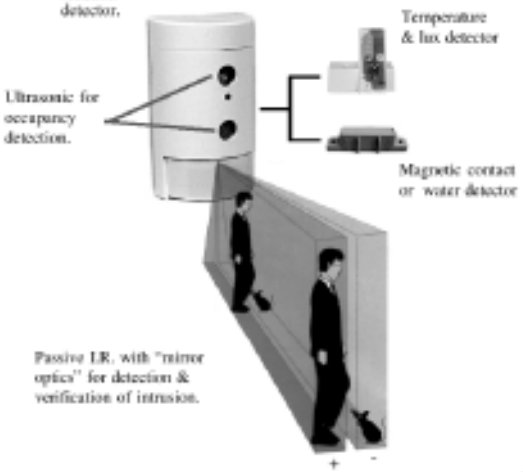
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Ultimately, the duty of an organisation member can simply boil down to at least paying the organisation fee on time. As Treasurer of the LNO, this is naturally a point very close to my heart! On the other hand, LNO members are well aware of the potential that lies within their preferred technology and of the responsibility they have taken upon themselves in the promotion and care of this technology and their own products. It would be going too far in this interview to list up all the privileges that LNO members enjoy. It goes without saying that, as an LNO member, financial advantages can be drawn that are easily calculable and that exceed the amount of the individual membership fee. The real strength of the LNO, however, lies in focusing the forces of its members. Bringing this into play in order to achieve a guaranteed return of investment for one's developments is the true value of the membership.

What is the LNO's position in Europe? Are the activities limited to Germany?

As mentioned before, the LNO must acknowledge that the time has come for networking the whole world. Humankind is building up its global nervous system. LON as a leading technology for networking at the sensor/actuator level, that is, through to the fingertips, has reached a degree of perfection that goes far beyond the simple description of ISO/OSI layers. Profiles describe product features that are independent of the network technology. This is something valuable that needs to be protected and increased. For this, a renewed combination of forces is necessary, this time on the European level. The first step of the LNO in this direction is lying in front of you: the European Edition of the LNO Brief (LNO Newsletter). Further steps agreed upon with our European colleagues will follow soon.

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LonWorks in Industrial Control

On 28 November 2000, the Industry Task Group re-established itself. An Industrial Automation Task Group existed between 1996-98. However, due to a lack of consensus over topics and due to moderate participation, the Group discontinued its activities. In retrospect, a number of other reasons can be attributed to the failure. The market analysis was too fixated on the competition with the traditional PLC / IPC / Fieldbus solutions. In the industrial landscape, ruled by Profibus, Interbus and CAN, as well as their powerful organisations, LonWorks hardly seemed to stand a chance of penetrating into this domain. Industry seemed not only disinterested in universal interoperability, one of the greatest strengths of LON, but also showed a pronounced scepticism due to its many negative experiences with fieldbuses. Additionally, there was, at this time, neither LNS as a network operating system, nor open tools with which such networks could have been set into operation within industry.

Thus LON was able, in only a few cases, to assert itself as an "isolated" application. One of the early successes was the automation of a textile dyeing machine from the company THEN in Schwäbisch-Hall, Germany. This naturally caused a big stir, yet was unable to unfurl a lasting effect. Nevertheless, with this first example of process automation with products from different manufacturers, it was possible to provide the proof that such complex equipment could be controlled and regulated completely without PLC. After this, a series of innovative industrial LON products were developed, from an integrated Multi-Chip Module (MCM) through to cabling suitable for industry. Today, after many detailed improvements, these dyeing machines with LonWorks control are being mass-produced and distributed worldwide.

Another, no less important, application is the production and regulation of especially pure air in so-called clean room solutions in the semi-conductor industry. Early on, the Stuttgart company, M+W Zander (at that time, Meissner+Wurst), together with the ventilation manufacturer, ebm, from Mulfingen, recognised the potential of LonWorks for the networking of thousands of so-called Filter Fan Units (FFUs) and developed a market advantage with it. Although the integration of further devices in such FFU networks is not normally desired, the advantage of cabling using free topology technology is, in itself, sufficient to make such a solution financially attractive.

In retrospect, it can be said that, in spite of individual successes, it was simply two to three years too early for LonWorks to gain a foothold in industry.

Motivation for a new launch 2000

In the meantime, LonWorks has made huge advancements in building automation. With the aid of numerous reference projects, it has been shown that, with careful planning, a building can be equipped with a single LON network across which the HVAC, electricity, lighting, sun protection and security functions, as well as an open control technology, can seamlessly interoperate. Such references in building automation lend themselves very well to the task of encouraging industrial use of LonWorks. Meanwhile, fundamental achievements have also been made by the Building Automation and System Integration Task Groups in improving the success and reputation of LNO System Integrators. High visibility international successes, such as the ENEL project in Italy, prove that LonWorks can be implemented in large utility company projects as a technologically and commercially superior solution. By contrast, LonWorks in industry has been confronted with numerous difficulties. These difficulties lie generally in the insufficient degree of recognition for LonWorks and, in particular, in the hesitant acceptance of the principle of distributed, intelligent control. The comparatively less intensive marketing and PR work for LonWorks in the industrial area, together with very little representation at the relevant industrial fairs, have created the impression that these markets have little potential. Even in the industrial trade press, LonWorks rarely receives a mention and, if it does, then it is often described as a "building bus". Without doubt, industrial applications, in contrast to those in building automation, are marked by a high degree of specialisation and great diversity, something that is reflected in the high number of medium-sized companies involved in them. That is also the reason why LonWorks was, until now, only able to achieve lasting success in only a few markets. Clean-room applications in the semi-conductor industry, and process automation in, for example, dyeing machines, have already been mentioned as positive examples.

Advantages of LonWorks in Industry

These difficulties must be weighed against a whole spectrum of advantages and opportunities. LonWorks, with its master-master concept and intelligent, distributed field devices, is technologically one generation ahead of today's industrial automation systems (PLC / IPC / fieldbus). That also stands true for the current trend of replacing the fieldbus with an industrial ethernet (no matter if it has or does not have deterministic behaviour). From the start, LonWorks realised a modern, object-oriented approach within field devices in the place of non-standardised analog or digital I/O points. With its robust and flexible Free Topology cabling technology (FTT-10A, FT-31), it is far superior to the conventional fieldbus cabling on the basis of RS485. Via the diversity of physical transmission media available, as well the fact that routing is an integral function of the protocol, it can fulfil specific demands elegantly and cost-effectively. Interoperability is clearly defined in the form of the LonMark Interoperability Guidelines and in the form of Functional Profiles and it lays the basis for open, multi-vendor solutions. Thus, for example, device profiles exist for motors, pumps, frequency inverters, valves, high voltage equipment and sensors.

Over and above this, the past few years have seen a series of developments that are very advantageous for LonWorks in industrial applications. Firstly, the LNS network operating system, in Version 3, now enables an open LON server to operate across an intranet or the Internet. LNS has been recommended by the Tools Task Group of the LNO as the standard platform for the integration of LonWorks systems on a PC basis. With the *i*.LON™ 1000 IP Server from Echelon – and comparable products from other manufacturers – the globally popular ethernet with the enhanced protocol LonWorks/IP as a further LonWorks channel, has now joined the well-known LonWorks channels FT-78, TP-1250, and Power Line. With the two transceivers FT-31 and PLT-22 from Echelon, the third generation of transceivers is now already available which, due to their continually improved electro-magnetic robustness, are today suitable for industry in every respect. Additionally, there are also fibre-optic cables and radio transceivers from third-parties for specific industrial applications. LonWorks has been an open ANSI/EIA 709.1 standard since 1997. This offers everyone the possibility of using processors other than the Neuron® Chip for industrial tasks. Thus the LonWorks protocol can also run today on a MIPS 32-Bit RISC Processor (on the *i*.LON™ 1000), as well as on an Intel Pentium III under Windows® (on the LNS Server or LNS Client).

Picture 1: LonWorks / LNS as a modern, universal system standard

Application areas of LonWorks in industry

In order to avoid past mistakes and not to fail on the realities within industry, the Industry Task Group set itself the challenge of searching for those application areas for LON in industry where:

- the specific qualities and advantages of LonWorks are brought to bear
- synergy effects with technical building automation are to be exploited
- a generic character is given, that is, an application field greatly independent from the specific industry and the specific production type
- time and / or production critical control or regulation play only a little role and thus potential conflicts with the established

manufacturers, such as SIEMENS or Phoenix Contact, is low

This task was concisely formulated in the form of a mission statement:

"The Industry Task Group sets itself the goal of establishing LonWorks, or LON, as an open, decentralised control network in industry and in industrial trade and service companies. It may be implemented as an independent system and / or as a functional extension to PLC / IPC / fieldbus systems. The work of the Task Group will be made known both internally (LNO) and externally (market) by means of public relations work, marketing and reference installations."

Examples of such generic applications were identified in several brainstorming sessions:

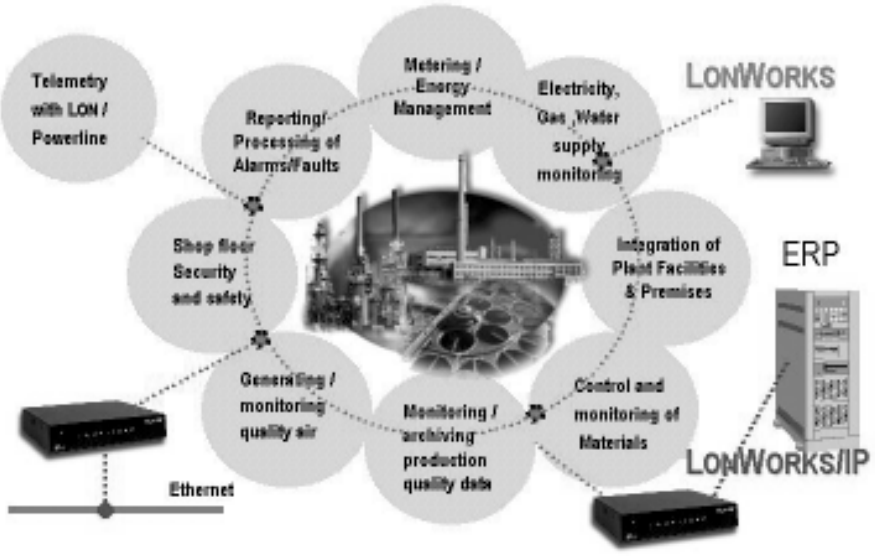
(1) Energy metering and management. Utility companies and all producing companies are addressed in order to record energy consumption near to production and to distribute it to corresponding cost-centres. Via load shedding mechanisms, peak usage can be avoided. Via the distributable intelligence of LonWorks, every consumer, every machine or every part of a process control system can, in principle, be equipped with an energy meter.

(2) Recording, reporting and evaluating alarms, events and operational disturbances. These applications also affect electrical utility companies, grid management companies, gas and water utilities, as well as all producing companies. Via the event-oriented functioning of LonWorks, such applications can be realised in an elegant and economical way.

(3) Distributing, monitoring and saving of resources. This is relevant for all tasks that deal with the provision and disposal of water, fluids, air, gases or other raw materials (e.g. granulate). This involves relatively "slow" control processes via motors, valves, temperature and pressure sensors, flowmeters, etc. all of which can be handled problem-free by LonWorks

(4) Recording, processing and archiving production data. This involves the whole complex of operational and quality data collection, not only for supporting operational processes, but also for the fulfilment of government regulations and obligations. It makes absolutely no sense to use expensive PLC / IPC / fieldbus systems for such data collection tasks, close to the production, yet not critical to it. LonWorks is here clearly the more flexible and more economical solution.

(5) Stocking up / rolling out, transporting and tracking of materials. In all production facilities, tools, semi-manufactured products, parts and materials must be moved, tracked in their movements, stored and buffered. Serving these purposes are conveyor and lifting equipment, pulleys and assembly line conveyors, flat and high rack storage areas, as well as photo sensors, transponders and the corresponding reader stations as sensor technology. All of these processes are mostly not time-critical. References in the printing industry, in large hospitals, and in the semiconductor industry stand as proof of this.



Picture 2: Industrial LonWorks applications

(6) Generating and monitoring air quality. This is a very specialised area that plays a significant role mainly in the semi-conductor and pharmaceutical industries. The application was taken up by the Task Group because it can serve as a reference for LON-controlled ventilation, extracted air or smoke / heat extractor equipment.

(7) Guaranteeing safety at work. This includes all general safety and personnel safety measures from access control for dangerous zones through to the surveillance and operation of photo sensors, warning equipment, restricted areas, barriers, illumination uniformity of escape routes, measurement of gas concentration.

(8) Technical building automation of production halls and premises. This involves, on the one hand, synergy effects with commercial buildings and, on the other, the integrated networking with the other, above-mentioned, applications. Due to the larger dimensions and more complex environmental stipulations, standard solutions are normally not possible. Here the flexibility of LonWorks is particularly in demand.

(9) Telemetry function with LON over a powerline carrier. This is a speciality of LonWorks as distances of more than 15 km, point-to-point, can be overcome without a modem via a PLT-22 based powerline communication over unpowered wires. In this way, remote test points and actuators – mostly electrical and pneumatic drives – can be selected and controlled.

(10) Integration of production and automation data via industrial ethernet, intranet or the Internet. Such integration solutions can be realised without difficulties using the client-server architecture of LNS, the i.LON™ 1000 IP server and an LNS-based OPC-Server as an open data interface.

Picture 3: Positioning of LonWorks in industry

Similar to those multi-device applications in building automation, networks can also be implemented in industry that encompass one or more of the ten above-mentioned applications. These can either be planned and implemented all at once or – more probable in practice – in stages, one after the other. In this way, a solution "from one mould" is developed with a common control technology and uniform interfaces for company-wide planning and data processing (ERP).

Positioning of LonWorks

From what has been said so far, it is clear that the Industry Task Group will mainly occupy itself with such tasks and applications that clearly distinguish themselves from conventional industrial automation. The picture on the left helps to explain this concept. In the centre is an industrial plant with the four traditional components: PLC, IPC, fieldbus and industrial ethernet. These control the actual production, e.g. the manufacture of cars, or the processes in a refinery. Around this, a LON-network is symbolised by a concentric ring that, on the one hand, integrates the above-mentioned applications and, on the other, offers via *i*.LON™ 1000, interfaces to the ethernet, intranet and the Internet.

In this way, LonWorks assumes a middle position or a intermediary function between classic industrial automation and the company-wide planning and data processing (ERP). The

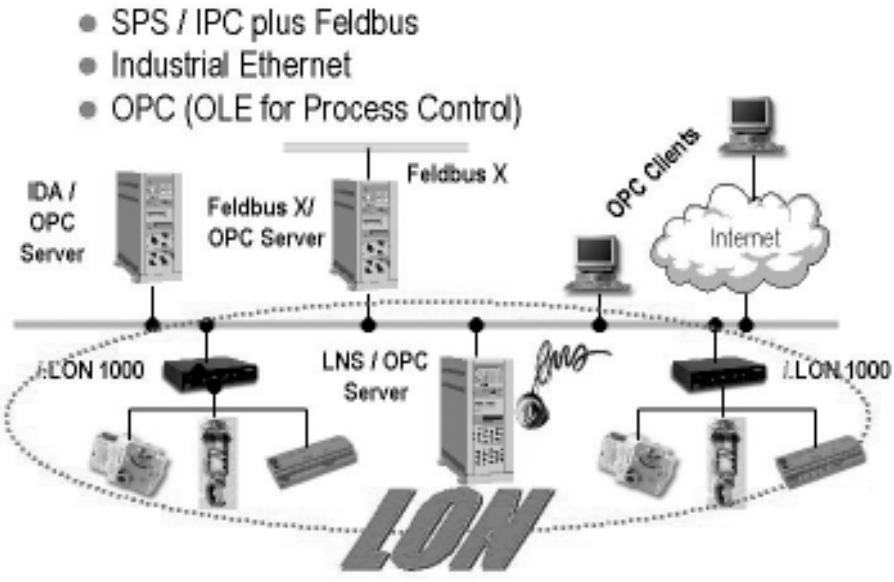
ethernet installed in the factory or equipment serves as the physical interface (e.g. in the specification as fibre optic cables or broadband cable). An OPC server based on LNS serves as the data interface. At the same time, one or more of the above-mentioned applications run across the LON-network autonomously and thus complete the automation infrastructure of the production (plant network).

This positioning within the production cycle uses the characteristics and advantages of the LONWORKS technology to the full, without creating overlap or conflicts with classic industrial automation. Both complement each other in an optimal way. It is even conceivable that further synergies could arise by means of a co-operation with the IAONA , an international consortium of manufacturers for the promotion of industrial ethernet as a common communications carrier standard. The first contacts in this direction were made during an information workshop held by the Industry Task Group on March 20, 2001.

Outlook

In accordance with the above formulated mission statement, the Industry Task Group will present itself in two ways at the Hanover Fair, within the framework of the joint LNO booth. Firstly, the content of this text will be shown in a lively presentation of about 10 – 15 minutes on a large screen several times a day. Secondly, some members of the Industry Task Group will present a short demonstration during which remote access to applications via i.LON™ 1000 and Ethernet, as well as the Internet, will be shown.

After a quarter of a year, the Industry Task Group has succeeded in agreeing upon a positioning and concentration of task areas that are characterised by a consistent, interoperable infrastructure. In this way, a good basis has been formed upon which we can build and upon which individual topics – of which there are sufficient – can be addressed in detail.



Picture 4: Integration of LONWORKS with other industrial automation systems

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Interview with Henk Walraven, Director of Marketing, Europe, Middle East and Africa, Echelon Corporation

Last year Echelon first starting shipping the i.LON™ 1000 Internet Server. How important is this product for Echelon?

The *i*.LON ™ 1000 Internet Server allows all LonWorks devices to be accessed with industry standard Web browsers on PCs, cellular phones, set-top boxes, and PDAs - all without re-engineering, reinstalling, or other costly changes to devices or systems. It enables corporate planning and data systems to pull information from devices embedded in their buildings and plants and uses this information to lower cost, improve quality, and increase efficiency. Therefore, the *i*.LON ™ 1000 is one of the most important devices Echelon has developed as part of our "Bringing the Internet to Life™" strategy.

Which technical advantages does the i.LON™ 1000 Internet Server offer?

The *i*.LON ™ 1000 offers unparalleled performance and reliability. Certified under the Cisco Net*Works* ™ program, the *i*.LON ™ 1000 integrates Echelon's control networking and routing expertise, together with Cisco's Network Foundation Technologies. The result is a Layer 3 LonWorks router that offers very high packet throughput for demanding process control, building automation, utility, transportation, and telecommunications applications. Cisco certification is your assurance that the *i*.LON ™ 1000 has been both rigorously tested and will meet the needs and standards of Information Technology (IT) managers worldwide. Adherence to the EIA proposed standard for tunneling ANSI/EIA 709.1 packets over IP, ensures that communications through the *i*.LON ™ 1000 are both open and interoperable.

Are there other innovative products which Echelon is currently developing? If yes, how will these products influence the world of automation?

Yes. As a technology company, Echelon is continuously developing leading edge technology products. A good example of this is the LonMaker Integration Tool, Release 3. LonMaker is a software package for designing, installing, operating, and maintaining multi-vendor, open, interoperable LonWorks networks. Based on Echelon's LNS network operating system, the LonMaker tool combines a powerful client-server architecture with an easy-to-use Microsoft Visio® user interface. The result is a tool that is sophisticated enough to design and commission a distributed control network, yet economical enough to be left behind as an operations and maintenance tool.

How important do you feel the Home Automation market is for Echelon? How will Echelon support the growth of this market?

A new type of network is making its way into the consumer marketplace, thanks, in part, to the LonWorks System which is based on an open ANSI standard from the Consumer Electronics Manufacturers Association (CEMA), known as EIA-709.
The LonWorks system from Echelon Corporation now enables the Digital Home. The LonWorks system includes all the components necessary to implement open interoperable control systems that can be easily and seamlessly integrated within a home - and beyond. This LonWorks system includes all the necessary hardware and

software components for implementing complete end-to-end control systems - from silicon to software.

Today, Echelon is the only company that is deploying Home networking on such a large scale. Over the next three years, we expect to have networked over 30 million homes.

How important is the European market for Echelon? In particular how important is the Enel deal?

Europe and Enel play an important role in our Home Automation rollout plan. Enel and Echelon have signed an R&D agreement under which Enel and Echelon will cooperate to integrate Echelon's LONWORKS system into Enel's remote metering management project, called "Contatore Elettronico".

Pursuant to this project, Enel expects to provide (on a three year rollout period) approximately 27 million Italian households with electricity digital meters, capable of being integrated into a complete home networking infrastructure. I believe this states the importance of our cooperation with Enel in the Home networking market in Europe.

In which branches does Echelon see development opportunities for LONWORKS?

Echelon focuses on four primary markets - commercial buildings (including subsystems such as heating, ventilation, and air conditioning, lighting, security, access, elevators, etc.), industrial applications, transportation systems, and homes. Within each market and sub-market, hundreds of leading manufacturers have built and deployed LONWORKS devices and systems worldwide.

Echelon's LONWORKS networks are recognized as a de facto standard for networking everyday devices across numerous industries. Many industries have acknowledged this pervasive use by adopting LONWORKS networks within their official industry standards.

With the growing number of LONWORKS enabled products, is interoperability becoming ever more important? How can Echelon guarantee this interoperability?

One of the leading partnerships we have to ensure this interoperability is with the LONMARK Interoperability Association. LONMARK is taking the lead in establishing standards for interoperability. Supported by a who's-who of controls companies, the LONMARK Association counts among its members not only the manufacturers fueling this revolution but also the end-users, equipment specifiers and system integrators driving its implementation.

The LONMARK Association's mission is to enable the easy integration of multi-vendor systems based on LONWORKS networks using standard tools and components. Today over 3,500 companies are using Echelon's LONWORKS platform to provide systems and solutions for building, home, industrial, telecommunications, transportation and other industries.

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The LONMARK Interoperability Association

Kevin Lynch is Executive Director of the LONMARK Interoperability Association. Here he talks to the LNO Brief European Edition about the role, the achievements and the goals of the LONMARK Interoperability Association.

What is the role of the LONMARK Interoperability Association?

The LONMARK Association's mission is to enable the easy integration of multi-vendor systems based on LONWORKS networks. Today, over 3,500 companies are using LONWORKS control networks to provide systems and solutions for building, home, industrial, telecommunications, transportation and other industries. There are more than 12 million LONWORKS-based devices installed world-wide. The Association provides an open forum for member companies to work together on marketing and technical programs to promote the availability of open interoperable control devices. The Association has three major functions:

- Promote benefits of interoperable LONMARK products.
- Provide collaborative marketing programs for companies developing LONMARK products.
- Provide a forum to define application-specific design requirements.

The availability of LONMARK products provides end-users, system integrators and equipment specifiers with the benefits of open interoperable multi-vendor systems:

- Choice of vendors
- Use of third party tools
- Easy integration

- Easy additions and changes
- Reduced installation costs

Where once end-users were locked into lengthy and costly service and upgrade agreements from a single vendor, they can now implement control systems using LONMARK devices from multiple vendors, picking and choosing devices that best suit their needs knowing they can be easily integrated. LonMark membership is open to any company, organisation or individual committed to the development, manufacture, and use of interoperable LONWORKS products and networks.

Can you trace the development of the Association since its beginnings in 1994 to the present day?

The LONMARK Interoperability Association was formed in May 1994 by 36 companies dedicated to promoting the use and development of open interoperable control networking products. To date, there are over 270 certified products available with more than 60 in the certification process. In addition, the last year has seen the Association membership increase over 25% to more than 300 members, representing industry leaders in building, factory, home and transportation automation. Working together, Association members are driving the widespread use of open, interoperable control systems across industries and across the globe using LONWORKS networks, the leading system for networking everyday devices.

What are the benefits of LONMARK certification?

Products that have been verified to conform to LONMARK interoperability guidelines are eligible to carry the LONMARK logo. The LONMARK logo is an indicator that a product has completed the conformance tests and has been designed to interoperate across a LONWORKS network. As more and more specifications call for interoperability combined with cost savings, ease of use and flexibility, the market for certified products grows.

Some specific examples of marketing benefits available to a member with certified products are:

- Inclusion in product section of the Interoperable News publication (circulation: 15000, published 3x per year)
- Inclusion in product press release
- Inclusion in product Wall of Fame
- Inclusion in product catalog
- Inclusion of logo in advertising and in booth display
- Case study publication, both in the Interoperable News and in the Yearbook
- Inclusion in advertorials and articles that are produced several times per year in targeted publications

Can you outline the benefits of LONMARK membership and explain what companies can expect to receive for their membership fees?

A key benefit of membership is the marketing support provided by the LONMARK Association. Members are eligible to participate in all LONMARK Association-sponsored marketing events; including tradeshows, editorial supplements, demonstrations, LONMARK periodicals, PR, on-line product catalogue, Task Group meetings, and General Meetings. There are many opportunities to have articles and case studies pitched to a variety of publications. We also provide a monthly on-line "Member Focus of the Month". We prominently display the member on the LONMARK Home page for all Members and visitors to see, and a link takes a visitor to a full-page write-up about the member. Membership fees cover costs for all of the marketing programs mentioned above. All members are notified via the LONMARK Member Forum of upcoming marketing opportunities. All current marketing opportunities are also posted on the Association web site and are accessible via the Members Only area in the Forum. The LONMARK Association maintains a calendar of world-wide events, and works with members to promote LONMARK Association-branded products at these events. Events are excellent opportunities to get an update on how LONWORKS and LONMARK products are being used to create innovative, flexible open control solutions, and a great opportunity for "networking," in the business-relations sense of the word.

In addition to marketing programs, the technical programs supported by the Association are also of great value in providing a forum to define application-specific standards. The opportunity exists for members to define further standards as market requirements demand. Finally, for members at the Sponsor and Partner level, the opportunity to have certified products is another great benefit offered by the Association. It is becoming more common on jobs that require interoperability between multiple manufacturers' products. Having certified products expands business prospects by being able to support these job requirements.

How successful is LONMARK in Europe? How about in other parts of the world?

The LONMARK Interoperability Association is a global organisation with members from all over the world. LONMARK has experienced a great deal of success in Europe with approximately 50% of the Association members located there. Europeans have embraced LONWORKS technology and are on the cutting edge of control networking implementation and development. The Association is also experiencing phenomenal growth in Asia Pacific as more and more companies there are discovering the benefits of open interoperable products.

What are the major events in the LONMARK calendar this year?

The LONMARK Association is a proud Sponsor of the Open Systems Tours presented by Echelon Corporation. The tour, which concludes its run in Europe at the end of March 2001, will continue in North America from April 17-October 2, 2001. The Association is also hosting the first of 2001's bi-annual General meetings in May in Helsinki, Finland, to be followed in October with the second, hosted in conjunction with Echelon's LONWORLD™ 2001 in Frankfurt. Additional events can be seen by visiting the Calendar of Events section of the LONMARK web page at www.lonmark.org

What are the Association's goals for 2001 and beyond?

The Internet has created tremendous opportunities and is changing the way that companies approach business. It is in these emerging business models that we see unlimited opportunity for intelligent, open, interoperable device networks like those built on the LONWORKS platform and LONMARK certified products. Appropriately, these are the same markets served by members of the LONMARK Association.
We will focus on applying these new models to both the "traditional" and emerging markets for networking everyday devices. We look forward to additional end-user, service provider, and IT-focused companies participating in the LONMARK Association. The viewpoint provided by these organisations will enable the development of devices and services that provide increased value to customers. We will continue the development and expansion of LONMARK certified products and will increase education programs focused on the benefits of interoperable control networks based on the LONWORKS platform.

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Sanacorp Pharmahandel AG Project, Ulm, Germany

Sanacorp is a leading, brand-independent pharmaceutical wholesale company and, with its DM 3.8 billion turnover, has a 13% share of the German pharmaceutical wholesale market. Acting as a link between the pharmaceutical industry and the drugstores, Sanacorp ensures wide-area, economical coverage of drugstores with medicines and healthcare products.

The Ulm branch has been extended (12.000 sq. m) by adding a product distribution centre with the latest automatic transport technology and automatic commissioning system, and an administrative wing with modern office technology. In the course of this, a globalised, open building-technology concept has been implemented on the basis of LONWORKS technology. This has led to a significant increase in the employees' productivity, and a reduction in energy costs.

Highlights

- LONWORKS room control including room temperature control, light control, and control of the sun-shades
- Control of room temperature and lighting in the offices, dependent on use
- Intelligent sun-shades save energy: when occupant is away, sunshades are lowered when cooling is required, and raised when heating is required
- Presence-dependent control of lighting in lobbies, constant-light control taking daylight into account
- Central light functions for various applications
- Energy optimisation: load-dependent adjustment of set points for heating and cooling systems

Honeywell Hydronic Controller W7762, registers room temperature, individual set-point adjustment, operation period extension, room-temperature control

Honeywell Excel 10 Fan Coil Unit controller W7752, LONMARK HVAC Profile #8020 FTT

Honeywell Wall Module T7560. Registers room temperature, manual set-point adjustment and adjustment of ventilator stage, display of room temperature, ventilator state, and room operating mode

LON Nodes Installed	approx. 600 in all
Topology	A total of 10 segments via FTT-10 backbone, attached to Honeywell central without gateway
Tools used	Unilon™ (Philips company) on LNS™ basis
Integrated Works	Heating, ventilation, air-conditioning, cooling, lighting, and shade
HVAC, Honeywell EXCEL 5000® system	Number of installed nodes 184 (Excel 50 / Excel 10 / actuators / wall modules)
Light control, model Philips Lighting	Number of installed nodes 363 HELIO Light Controllers / multi-sensors / presence sensors
Sunshades, model SOMFY	Number of installed nodes 81 (sun protection actuators)

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Planning Electrical:
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The Central Ring of the state capital of Munich is the site of the new Depfa Bank headquarters. Here, 2000 sq. m of office space are to be created at an investment cost of 25 million German Marks. In the planning phase, particular emphasis has been put on attractive architecture and innovative technology that, through its global conception, allows savings in both the installation of the devices and the running costs. The requirements that were made led to the selection of LON technology for the process control technology.

One particular challenge in installing and wiring the room-temperature sensors stemmed from the glass partitions between the offices. This problem was solved by using sensors based on radio technology which feed their measurement values into the LONWORKS network by means of special receivers.

Highlights

- Comprehensive, LONWORKS - based automation concept
- Room automation concept includes heating, air-conditioning via chilled ceilings, lighting, shade, and warmth and energy metering
- Integration of a LONWORKS - based weather-station, which controls the sun-blinds dependent on wind or rain
- Automatic shading of direct sunlight
- Access control on LONWORKS basis planned
- Room operation for individual, convenient adjustment of lighting, sun-blinds and set point through standard web browser via the intranet
- Radio frequency-based Wall Modules for wireless data transmission

Technical Data

Installed Nodes: 500 LON nodes from the manufacturers
- Honeywell (Excel 10 Chilled Ceiling Controller W7763, LONMARK HVAC Profile 8020),
- SVEA (Weather station, light actuators, light push-switches and multi-sensor),
- SOMFY (Sun-blind drives),
- Arigo (Warmth and energy meters)

Topology: Backbone with 25 sub-networks, FTT10 and LPT10

Tools Used: LonMaker for Windows

Integrated Works: Heating, cooling, lighting, sun-blind control, energy and warmth metering.

Honeywell Excel 10 Chilled Ceiling Controller W7763, Application corresponds to the LONMARK Profile 8020

Honeywell Wall Modules

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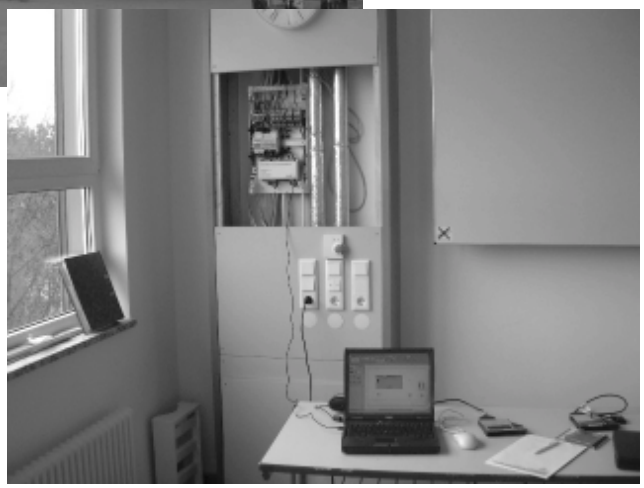
Rudolph Diesel School Project, Waldkraiburg, Germany

Overall building technology planning: Günter Bittner Engineering Bureau

The Rudolph Diesel School is housed in a new building with 40 classrooms on a total of 4 floors. To provide optimum learning and teaching conditions for students and teachers, and at the same time to keep energy costs low, the City of Waldkraiburg has implemented a future-oriented building-automation concept in the elementary school, based on LonWorks technology.



Highlights

- Room control, including heating, lighting and sun-shade control
- LonWorks weather station (made by SVEA) retracts sun-shades in wind or rain
- Light-dependent movement sensor switches lighting off when ambient light is sufficient, and no-one is there
- Automatic shading in direct sunlight

Technical Data

Installed Nodes
Up to now, 60 LON nodes from the manufacturers Honeywell (Excel 10 Heating Controller, LonMark Function Profile #8020), SVEA (weather station, DO modules for light actuators, LON DI modules for light push-switches and multi-sensor), REKO (sun-shade control)

Topology
One backbone, 7 sub-networks with routers, mixed FTT10 and LPT10

Tools Used
LonMaker for MS-Windows®

Integrated Works
Heating, lighting, sun-shade control

Honeywell Wall Module T7460, relative set-point adjustment, override button for presence, optional ventilator switch for manual setting of ventilator stage

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LonWorks has its way regionwide, nationwide, worldwide

In contrast to some West European managers who still understand "building automation" as science fiction, it seems quite normal for our East European neighbours to make use of modern technologies. At the new administration building of the National Bank of Slovakia (NBS) in Bratislava, for example, intelligent façades were realised by implementing LonWorks technology.

NBS

Johnson Controls was commissioned to the project for its control engineering and it chose REKO electronic GmbH from Marktheidenfeld (Germany) as its partner for the sun protection control concept.

As one of the most famous manufacturers of electronic sun protection controls and daylight systems, REKO electronic has shown its expertise in many projects and demonstrated that it is able to meet new demands of its customers. Employing the LonWorks technology consistently makes it possible for REKO electronic to apply new beneficial qualities in sun protection and daylight systems:

- decentralised annual shading and slat tracking, depending on the sun position
- use of synergies for energy reduction leading to cost savings on building operation costs
- reduction of heating/cooling load by slat tracking
- best ergonomics when working at computer monitors by automatically-driven anti-dazzle protection
- minimal use of artificial light by using the light deflection function
- decentralised convenience

The National Bank of Slovakia Building

The following aspects have been ordered by the planners of the National Bank of Slovakia (NBS) project :

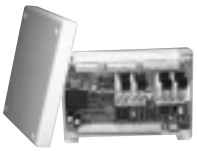
- It should be possible to manually change the length of the blinds by using room control devices. The slat angle should remain unchanged.
- Slat tracking should depend on the position of the sun.
- Room control devices should demand cooling or heating support from the sun protection

LonWorks technology permits intelligent distribution of big systems across a network of decentralised devices. The basis is the standardised communication protocol, LonTalk®, by which these decentralised devices, the so called nodes, exchange data. Devices from different manufacturers may be integrated into one network without adjustments.
The transport media for LonWorks components are: twisted-pair, coaxial, fibre optic, infrared, radio or 230V-supply lines. The spatial extension of LonWorks networks is unlimited because its data may be transmitted via TCP/IP – the transport protocol of the World Wide Web.
Some of the transport media no longer need a fixed network topology, as for example a pure ring structure or line structure. The free topology of LonWorks networks allows an almost unlimited network structuring.
Central control units are not necessary because the decentralised distributed intelligence inside the nodes lends a lot of functionality to every single node itself. Therefore sensor nodes are able to measure physical quantities, to process respective data and send them to other nodes working as actuators. In answer to this, the actuators carry out appropriate functions in their special field.
By sharing data between LonWorks devices for different purposes, very complex functionality is possible, as is evident in room control or sunblind control. This functionality goes beyond the capabilities of conventional systems.
A good example of this is a LonWorks weather station which can detect significant changes of wind velocity and can send a standardised data telegram to sun protection controls, as well as to other devices. After that, every control decides whether the current wind velocity is still acceptable for the connected awning, or whether the blind has to be raised for protection.
This shows that central control units are not only superfluous but sometimes even completely unsuitable. If, for instance, many different types of sun protection blinds exist in one building, every control should be able to monitor individually the wind velocity - for "it's own" sun protection blind.
A decisive advantage of the LonWorks technology is the flexibility of its networks, that is to say, the possibility of choosing the topology freely and the possibility of changing the communication relationships between the nodes. When changing the application or enlarging the system, no change in the wiring is required. The nodes are informed - via PC software - that they will communicate in future with different or with additonal nodes.
This is one of the few situations in which functionality is necessary in a central position too. More examples are network-managment, visualisation, alarm protocols, central operation function and so on.

controls so that, during the slat tracking, different reflecting modes are used.

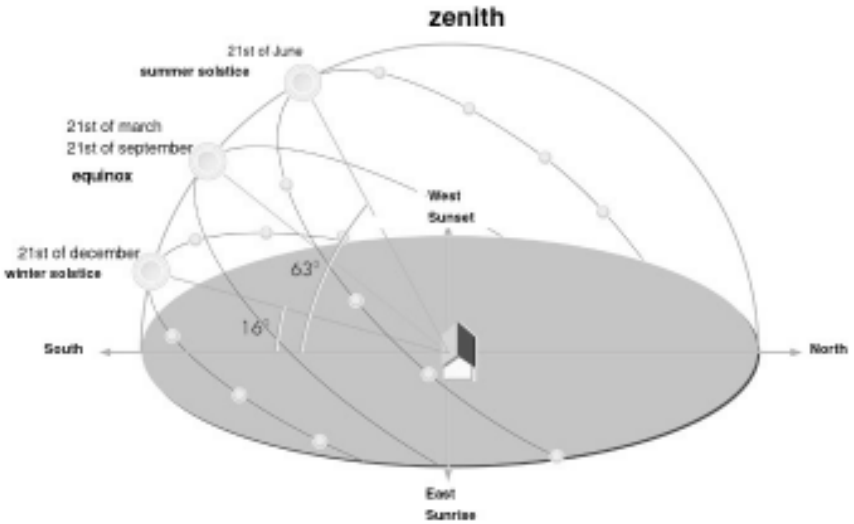
- For support in "cooling", the slats adjust angles, allowing maximal reflection and therefore reducing the warmth going through the windows. Nevertheless the anti-dazzle protection is maintained.
- For support in "heating", the slats adjust angles raising the warmth going through the windows. Here the anti-dazzle protection is also maintained.
- Sun protection controls use the impulse generator of the sun protection motors for the exact determination of the blind's position.

The sun protection system from REKO electronic GmbH only demonstrates a part of the total efficiency of REKO electronic controls. 786 different 2-fold or 4-fold LonWorks sunblind actuators, two LonWorks weather stations, as well as various components for the network infrastructure are currently in use. Both weather stations detect the climate conditions and precisely calculate the position of the sun with the precision of their radio-controlled clocks. They are LonMark certified and also useful in applications other than just sun protection. The controls are able to calculate the slat angles in an ideal way. They also consider the shading of the environment and the weather conditions, precisely drive the motors to one degree, use directly connected conventional sunblind keys etc. The calculation of the sun position and the slat angles exceeds the precision of other controls currently available on the market.



4-fold actuator from REKO electronic GmbH

Sensor Unit SE II-B from REKO electronic GmbH



User demands encompass an ideal combination of convenience on the one hand and energy saving on the other. The compromise between manually changing the blind's length and the automatically calculated slat angle allows the users individual operation of the lighting conditions, without losing the aspects of anti-dazzle protection and energy savings. Protection against dazzling is ensured and the sun protection actively supports the reduction of both cooling, as well as of heating costs.

Employee efficiency is naturally directly affected by the conditions surrounding them - a potential which has to be utilised. The teamwork of devices with different functions such as sun protection and heating/climate/ventilation offers possibilities which can only be achieved by using LonWorks technology. Comfortable working conditions are no longer in opposition to the demands of the building operator to minimise the costs through energy savings. By means of the "National Bank of Slovakia" project, all European managers are called upon to not only make cost calculations depending on the effective costs of the construction, but to also look more at an extensive cost benefit analysis. Progress serving people – an achievable aim by applying LonWorks technology.

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Door Management System TORMAX UNINET - a new way of networking

The project

Soon after the Rhein-Main-Flughafen Gesellschaft mbH took over the old American airbase at Hahn, West Germany, they were granted permission to operate incoming and outgoing flights 24 hours a day. This resulted in a dramatic increase in freight tonnage, requiring a new 35,000m² freight building with all the inherent security problems. A similar increase in passenger numbers necessitated the construction of a new passenger terminal.

The challenge

How could security be maximised? What could be done to minimise loss of energy and provide comfortable, convenient access for passengers?

The solution

A typical solution to the problem of security, safety, environmental protection and passenger comfort, is the installation of TORMAX high-speed automatic doors. The sliding doors are fitted with direction-recognising sensors, integrated safety beams and locking systems, together with the weather seals. The TORMAX onboard control unit continuously monitors all critical functions, thus insuring reliability. Due to these advantages, 9 TORMAX automatic sliding doors for rescue and escape routes have been installed at Hahn airport.

Enhancement

The dramatic and outstanding feature of the TORMAX automatic door installation at Hahn airport is the incorporation of the state-of-the-art technology, UNINET.

This is unique and exclusive to TORMAX, providing unparalleled centralisation of management, control and diagnostics of automatic doors.

The UNINET system consists of a UNICOM device installed in each automatic door to concentrate the doors' intelligence and relay it through a LON-bus to a central computer programmed with UNINET software.

UNINET can be "stand-alone" or it can be integrated with a recognised Building Management System by means of "plug-ins".

Advantages

Due to the outstanding advantages of centrally monitoring the sliding doors, the owner of Hahn airport has decided to install a stand-alone UNINET system. And it is not only the owner of Hahn airport who is satisfied, but also many more users of TORMAX UNINET world-wide are convinced of the benefits of this Door Management System. To summarise, UNINET offers the following benefits:

- being ahead of competition by utilising a modern, reliable, flexible and forward-thinking control system
- high user comfort and maximised functionality, as all door operating parameters and modes can be changed from a PC
- increased security due to permanently controlled entrances and 24-hour alarmed monitoring
- safety integrity because of constant checking
- lower labour costs due to programmed opening and closing of doors via a PC
- constant functionality of doors because of rapid response to abnormal door conditions. This is due to UNINET's instant fault reporting
- installation labour savings due to LON wiring connection
- inexpensive subsequent changes to existing Door Management Systems by taking advantage of the plug-and-play capabilities provided by the LON system

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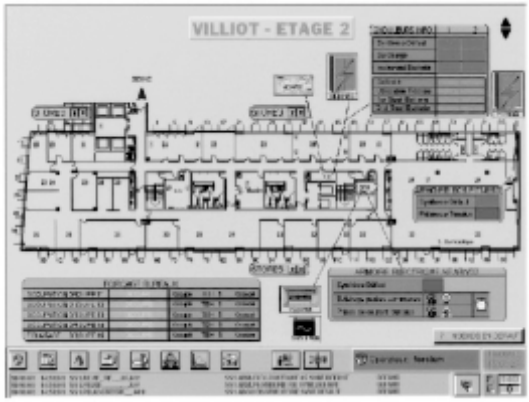
Central Seine Building – Van Gogh

Constructed by Eiffage Construction for the building owner, DIFA, and located in the heart of Paris, this building was selected by AVANTIS. It has two integral wings with 14 floors and 4 parking lot levels representing 28,000m^2 of office space.

The BMS (Building Management System) was entrusted to FORCLUM Informatique et Systèmes, an integrator with skills in the fields of SCADA Software, automation and safety. The integrator contributed to the success of this application in:

- The functional design of the building with a "grid layout" of the technical equipment by wing, floor, and at the parking lot level
- The organisation of the areas into technical rooms, offices and open spaces in harmony with the layout of the equipment
- The engineering of the specially designed remote control equipment and the infrared interfaces, shutter control gateways, and the office space configuration software.

For the automation of the building, FORCLUM I&S opted for a solution based on the LONWORKS network and on ARC Informatique's PcVue 32 SCADA.



LONWORKS is entirely suited to customer needs in terms of functional criteria, such as:

- Flexibility: allowing the arrangement of the available surface areas, offices, open spaces and the logical reallocation of the equipment (light fittings, shutters and blinds, air conditioning, central heating, etc.) as a function of the new set-ups
- Service to users – allowing separate and fully independent adjustment of the amenities by means of individual remote control

… and in technical and economic terms too:

- Optimisation of global costs as well as equipment maintenance (shutter and blind motors, fan coil units, etc.)
- Easy implementation and management of the installations through the interoperability of different brands of equipment.

PcVue 32 fully satisfies the needs and constraints of the BMS, especially with respect to:

- The technological edge and availability of the product with respect to the LNS solution used
- The flexible use of its functions and, in particular, the time schedules used for the creation and modification of the calendars
- The multi-station network solutions adapted to the building configuration with data processing at several local stations.
- The power of the hierarchical database and the object technology available in the software.

During this construction, FORCLUM I&S emphasised and appreciated the performance and responsiveness of the technical services and support from ARC Informatique with respect to its customer.

This BMS is comprised of 1700 fan coil units, 1500 remote control devices, 450 infrared interfaces, 710 lighting interfaces, 1600 receivers, 64 gateways for the shutters and blinds, 31 routers and 30 LON repeaters, 3000 nodes, 34 IPC, 12 PcVue 32 SCADA stations (10 servers, 2 clients). The application is comprised of 22000 variables, 50 mimics and 1800 trend curves.

Engineering began in July 1999 for delivery to the customer in September 2000. Nine months later, the use of the building and its BMS is to the entire satisfaction of the customer. The new layouts for the personnel and offices have already led to more than 300 office creations or relocations. This development of the space has taken place without any disruption to the BMS operation or to on-site personnel work.

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Maersk Data's new headquarters/ LON connection for building automation

Danish Infranet Partner, LK Netlon, were recently awarded a contract to supply an intelligent building automation system based on the latest LONWORKS technology (LNS-based) for Maersk Data's new headquarters in Vibenhus Runddel, Copenhagen.

300 room controllers, 1500 movement sensors and a couple of frogs

Owned by property firm, Kirbi, the Maersk Data building is located on one of the busiest traffic junctions in Copenhagen. Vibenhus Runddel has been famous for it's tower for many years. The tower housed a huge illuminated advertising display that nearly all Danes have heard of. It consisted of large frogs that "jumped" towards the tower. Traditionally, the frogs were a landmark for the firm Galle & Jensen who had a chocolate factory at this site. Today, the building below the frogs is occupied by Maersk Data.

The Building Management System (BMS) at Maersk Data is one of the largest installations in Denmark today, consisting of more than 300 room controllers and approximately 1500 movement sensors. Although there are hardly any switches in the building, it is possible to override the lights using remote controls.

Simply the best

Installation company, E.Kallesoe A/S, were the electrical installers for this big project. Mr Flemming Hansen of E.Kallesoe commented on why Netlon were chosen for the project:

"Maersk Data wanted a LONWORKS installation. We checked out several other systems and chose Netlon for different reasons. Theirs was the most flexible, it was the easiest to install and also the most economical. The system is easy to survey and, the fact that the room controllers are pre-programmed, is one of the main reasons why we chose it." Mr Hansen added, "If we had any questions during the installation, we received fantastic support from Netlon. The fact that during the project LK and Netlon established the company LK Netlon just confirmed our excellent choice."

50% New build, 50% Refurbishment

Work started in March 2000 on the new half of the Kirbi building, the other half of the project consisted of refurbishing the existing building. On the 22 December, approximately 900 staff moved into the new 32,705m^2 office building, and the remaining 200 staff moved in a few weeks later. With the exception of the chairs that everyone brought from their former building, everything else was new!

There is 9,000m^2 of ground space with almost 33,000m^2 over 6 floors. 21,000m^2 is administration space and the remainder is basement and parking space for 220 cars over 2 floors. The building has 300 offices and various meeting and conference rooms.

The choice of colours for the new building was white with different shades of grey. There are steel, glass and dark mahogany floors so to break

the grey. There are also bright red stairs and green kitchenettes. On the first floor, the huge canteen and café have silver grey chairs. There is a beautiful hall with a glass ceiling and footbridges. The hall and lecture rooms are acoustically regulated with plates and, together with lots of leafy plants, an elegant architectonic impression is formed.

Maersk Data got the solution they wanted

Mr Rex Muller of Maersk Data, who was managing the project, said, "We received the solution that we wanted. We focused on the indoor climate. The installation controls constant light, cooling, ventilation and the sunblinds. When a room is left unoccupied for a specified length of time, the lights will automatically turn off and cleaned, chilled air is also controlled by the room controllers. We chose Netlon because of the reasonable price: it was cheaper compared to other systems.It is also a big advantage that the room controllers communicate with our HVAC system."

The LONWORKS integration tool used in the project is Pathfinder (LNS-based) from German Infranet Partner, TLON GmbH. Pathfinder is well known in industrial applications. Tootsie 100 (Toolkit for System Integration) was very helpful during the commissioning and maintenance phase of the project. The graphical user interface, developed using Perspective from UK Infranet Partner, Calon, enables the user to change setpoints such as temperature, light level, timers etc in every single room. The screen also provides information such as which rooms are occupied, the current room temperature and running hours. All sensors and actuators are connected to each room controller, including the sunblinds. They can be controlled or displayed by the LNS-based Perspective.

The frogs will still be taken care of!

Oh, and don´t worry about the frogs! Even though the tower has today been made into a state-of-the-art building, the frogs will still be taken care of. Kirbi owns the tower, and it is still rented by the chocolate factory. So the frogs are still jumping!

Facts

Building owner:
Kirbi property administration. A/S

Contractor:
KPC BYG A/S
Specifier:
Bascon A/S
Lease-holder:
Maersk Data A/S
Architect:
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Installer:
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Helsinki story: LON connection of churches

Finnish Infranet Partner, Fatman Oy, together with the Consortium of Evangelical-Lutheran congregations in Helsinki, have made an agreement to use LON technology to connect more than 100 buildings, including churches, office blocks and residence buildings, to the central real estate surveillance facility serving the all the congregations.

The congregations' Consortium decided to reconstruct outdated sub-stations and use LON technology both in these and in all new objects. Fatman Oy built an Infranet network that connects the buildings' automation systems to the central real estate surveillance facility. HeadMaker, a human-machine interface application, monitors and controls the network. The surveillance occurs via telephone and ADP networks. Benefits of the LON-based technology include its multi-vendor capability, that is, the ability to choose between different manufacturers' automation products. In addition, it also supports the use of old sub-stations so they can be exploited for a long period.

This project began in January 2001 and will take about 3 years to complete. The LONWORKS integration tool used in the project is Pathfinder (LNS based) from German Infranet Partners, TLON GmbH. Pathfinder is well known in industrial applications. The Headmaker Application is based on an LNS-XML OPC server (Infra_OPC) from TLON. Tootse 100 (Toolkit for System Integration) has been specified for the the commissioning and maintenance phase of the project.

Fatman Oy was founded in 1991 to serve the needs of facility technical management. Today Fatman employs about 35 persons. Fatman Oy is an associate member of the LONMARK Interoperability Association, a member of Infranet Partners and a member of LonUsers® Finland association. Fatman Oy is also an approved and registered consulting company in EU-projects.

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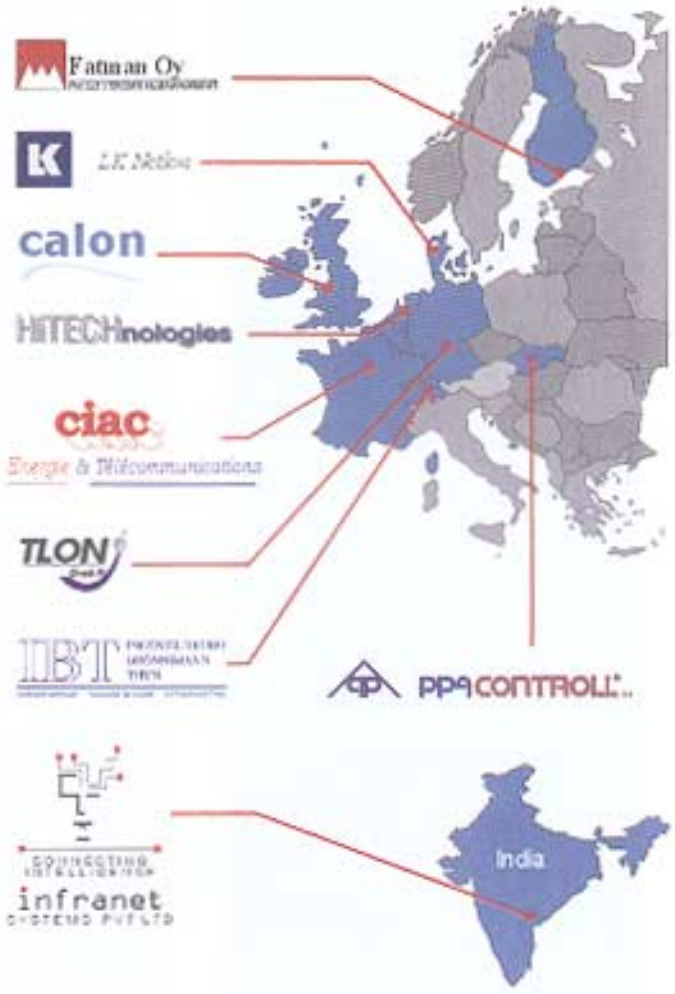
- ☆ Offering full technical support to our customers and LonWorks® training courses through our popular Infranet Academy.



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Heavenly Building Technology

Background

Munich's landmark, the 15th Century Liebfrauen cathedral, with its famous two bulb-shaped towers, is probably one of the most striking architectural sights in the Bavarian capital. It plays a crucial role in liturgical ceremonies of international renown and therefore possesses complex technical facilities that outsiders would probably never expect of a time-honoured place of worship. As a result of the modifications and expansion of the cathedral's vestry, it was decided that along with the renovations, the cathedral's technology should also receive a facelift.

The Challenge

During the modernisation of the heating equipment the previous year, it was foreseen that all existing and all newly acquired components, such as light control, alarm systems, video surveillance and control of the church bells, should be operated and monitored via a central point. Alongside the integration of existing and new systems, particular challenges of this project arose from the restrictions on architectural alterations imposed under monumental protection laws, as well as from the demand for the continued smooth day-to-day running of the cathedral.

The Solution

For the system integration, the building owner, the Erzbischöfliche Ordinariat München (the Archbishop's Ordinariate, Munich), chose LONMARK Partner MSR-Technik GmbH from Pocking, Germany. For the building technology, the choice was for LONWORKS due to its many benefits such as multi-vendor capabilities, openness, as well as interoperability

guaranteed by the LONMARK Interoperability guidelines. Through the integration of products, including those from LONMARK members TAC, and Johnson Controls, MSR-Technik created a completely new building technology concept, providing better control of the various electronic systems in the church and offering the highest level of comfort for the user, maximum security, and financial benefits.

Security and Automation

The integration of various components and systems into a compact user-interface was achieved via two parallel 19“ touch-screen monitors within the vestry. Via these password-secure user-interfaces, church personnel can set all vital parameters. During an alarm, the sacristan receives a message via a pager. Information retrieval can then either occur via a remote diagnosis system or from the sacristan's personal PC. He is able, for example, in situations of danger, to switch on the lighting or the video surveillance equipment and follow every movement, via door contacts, movement sensors and other security features.

The purpose of the cathedral's modernisation was not only user-convenience and security, but also the automation of various applications. Thus LONMARK-certified TAC Xenta® 401 module from LONMARK Sponsor member, TAC, was implemented for the control of different light and dimming features, for the control of the cathedral's bells and for the control of the sound system. Through the TAC Xenta® 401, the cathedral lighting can be controlled via a dimmer sensor outside of service hours and the sacristan can choose between various bell sounds via a service-panel, depending on whether the service takes place on a weekday, a public holiday or during a mass. The LONMARK certified TAC Xenta® 302 devices control the ventilation motors for the sacristy and the ministrant's changing rooms. Ventilation for the rest of the cathedral is achieved via modules from LONMARK member JCI Johnson Controls, type DX9200.
Besides ventilation control, the TAC Xenta 302 are also responsible for limiting peak usage of heating and lighting, for the regulation of the underfloor heating, the wall heating, as well as for their deactivation during the summer months.

Due to the multi-vendor capabilities of LONWORKS components, guaranteed through LONMARK Interoperability, the Liebfrauen cathedral in Munich was able to pick and choose products from various manufacturers to create a technologically sophisticated system within its 15th century walls.

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LONMARK Around Europe

The following success story snippets will take you on a European tour of office blocks, hospitals, motorways, banks and train stations that rely on LONWORKS technology and LONMARK certified products. Are you ready for the ride?

Denmark – Bank invests in LONMARK Interoperability

Unibank in Copenhagen, Denmark's second largest bank, opted for LONWORKS technology and plug-and-play components from leading LONMARK member companies such as Philips for lighting control, Somfy for sunblind control and TAC for VAV (Variable Air Volume) control in its headquarters building. Blending in with the harbour-front where it is located, the 54-storey headquarters house all of Unibank's business units. Brightness and temperature are regulated in the rooms via lighting and temperature sensors that communicate constantly with the internal lighting system, the blind control, the heating and the ventilation equipment. In this way, lighting is optimised and, at the same time, energy is saved.

Finland – ABB opts for LONMARK

Employees at ABB's office building, Tellus, in Helsinki, enjoy a flexible and modular building with a comforable indoor climate thanks to LONWORKS control networking technology. The building's automated lighting system is based on LONMARK certified light controllers, switches, Lux sensor and occupancy controller combinations from Helvar. The lighting system is designed to create significant energy savings by optimising

Tellus Building, Finland

light based on presence. Lights are automatically switched off 10 minutes after the occupancy sensors indicate that nobody is in the area. Additionally, energy supply to lights is reduced when sufficient natural light shines through the windows. Honeywell products control all air conditioning and cooling systems within the building.

France– LONMARK conquers heart of La Défense

In La Défense, the technological heart of Paris, 5 office blocks, covering 160,000m^2 of office space have a multi-functional and cost-effective Building Management System thanks to the integration of 15,000 interconnected devices interoperating across a LONWORKS network. The Coeur Défense complex includes over 8,000 LONMARK certified fan coil regulators for heating and cooling from Siemens Landis & Staefa Division and over 4,000 Philips 8-way lighting controllers serving 32,000 luminaires.

Germany - German Railway travels in style with LONMARK members

In Germany, the high speed ICE railway station serving the Frankfurt/Main airport was the first station to install a comprehensive building automation system based on LONWORKS technology for controlling the HVAC, lighting and security systems, as well as for access and lift control. The station, labelled "station of the future", was integrated by Hermos with products from LONMARK members TAC, Tridonic, Gebrueder Trox and Sysmik.

Italy - LONMARK members form core in major Italian highway upgrade

A 150 km span of highway covering Italy's Liguria and Tuscany regions is now benefiting from an automation, monitoring and security modernisation. The highway, which includes 13 tollgates, a main service office and 21 tunnels – 3 of which are fitted with a ventilation system, has undergone a major renovation to integrate remote

ICE High Speed Railway Station, Frankfurt, Germany

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Find out more about LonWorks device networks by visiting our website at www.echelon.com, and visit our live home at www.echelon.com/demo.

parameter checks on the roads and in the tunnels. These improvements allow for faster emergency response times, expanded user security and increased productivity. The project was integrated by LonMark Associate Elettrodinamica SpA, and includes LonMark certified products from CTI Products and Weidmüller (now Moeller ElectroniX). The result is a reliable, cost effective interoperable control solution with remote monitoring capabilities.

Norway – LonMark creates talking telecom building

In Norway, leading telecommunications provider, Telenor, recently incorporated its 9 previous office sites in Bergen into one 26,000m^2 Head Office in Kokstad. To meet the company's demand for a high-tech office building with flexibility and adaptability, Simonsen Ing. K A/S integrated 4100 nodes including 7 i.LON™ servers and more than 80 routers. At the click of a mouse on PC monitors, employees can check outside weather conditions and change the temperature and lighting in their rooms accordingly. LonMark-certified TAC controllers regulate the heating, ventilation and cooling processes in the building. Interoperating with the network controllers are temperature control devices from Honeywell and air volume control devices from BELIMO Automation AG.

Telenor, Norway

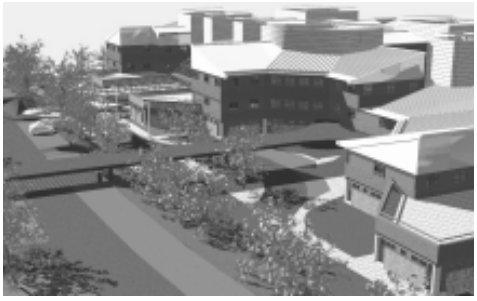
Sweden – University takes a lesson from LonMark

Sweden's Malmö university opted for LonWorks technology and LonMark certified products for it's Gäddan 8 building in order to achieve environmentally responsible facilities. TAC, the System Integrator, integrated 800 nodes that control the heating, ventilation, access control, security, lighting and wall clocks. TAC controllers regulate all HVAC functions and the lighting in the classrooms. Lecture room lighting is activated by a Helvar system, and deactivated as presence detectors indicate that the room is vacant. Ventilation is regulated according to the number of persons present in a room.

Malmö University, Sweden

UK – Hospital finds cost-saving cure with LonMark

In the UK, a new £126m state-of-the art acute hospital is under construction using products from LonMark members TAC and Honeywell. Here everything from the food storage temperature in the kitchen areas, the lifts and lighting, the CCTV systems and fire alarms through to critical medical systems such as the Nurse Call alert hardware, medical gases supply and control of temperature for the blood banks and cryogenic storage facilities, will be integrated, supported and monitored via the LonWorks network.



South Tees Acute Hospital, UK

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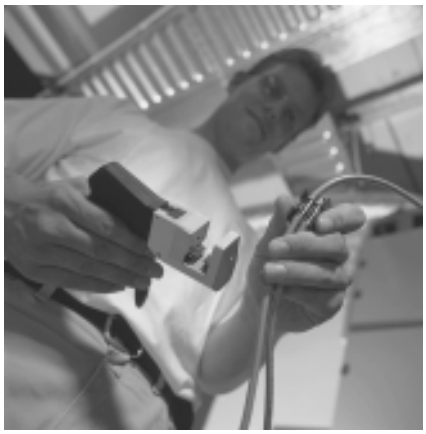
email: cory@tema.de

please also visit:
http://www.lonmark.org

DRAKALON®: The No. 1 cabling system for LONWORKS Networks

To make it easy to install a LON network fast and reliably, Draka now provides a complete cabling solution: DRAKALON®

This unique system was developed in close collaboration with the connector manufacturer, Tyco Electronics AMP. Its three components – a network cable, connectors and a very practical hand tool - are perfectly geared towards one another.



DRAKALON®: fast, flexible and reliable

DRAKALON® network cable 42V, 2x0.75 mm²

- Precisely fits into the DRAKALON® connectors.
- Filler and outer sheath are joined together so they can be stripped in one action.
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DRAKALON® connectors

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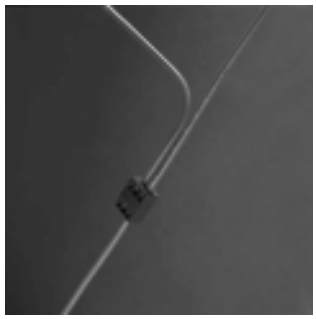
- Suitable for connecting one or two drop cables.

DRAKALON® hand tool

- A unique tool for stripping the cable and making the connection.
- Very practical and durable.



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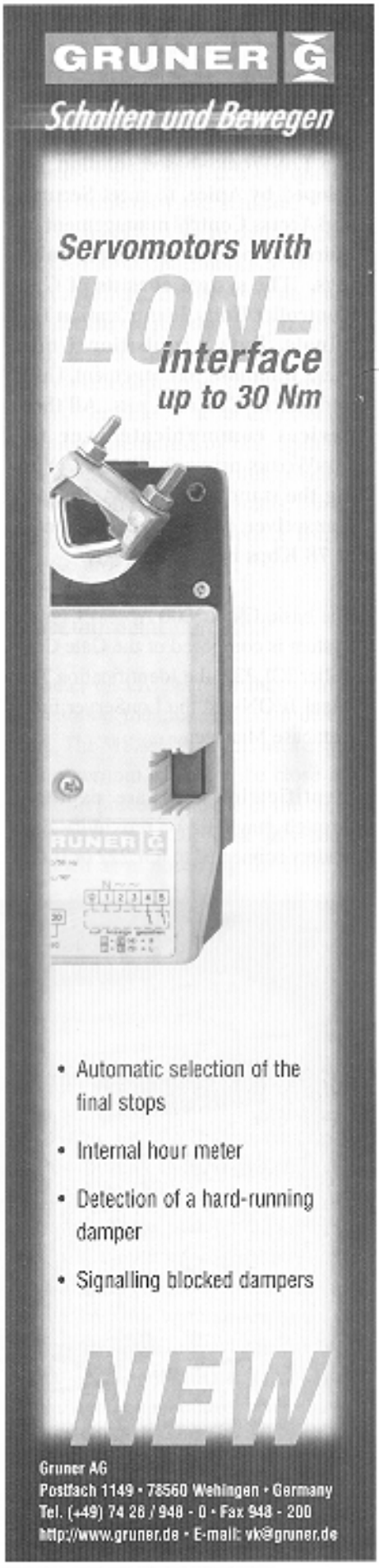
Fax: (+49) (0) 209 9239332

The advantages of DRAKALON®

- Fast and easy installation.
- Perfect connection with excellent long term reliability
- Maximum flexibility, both during installation and afterwards. LON components can be added, removed or modified without interrupting the circuit.
- A clear network topology.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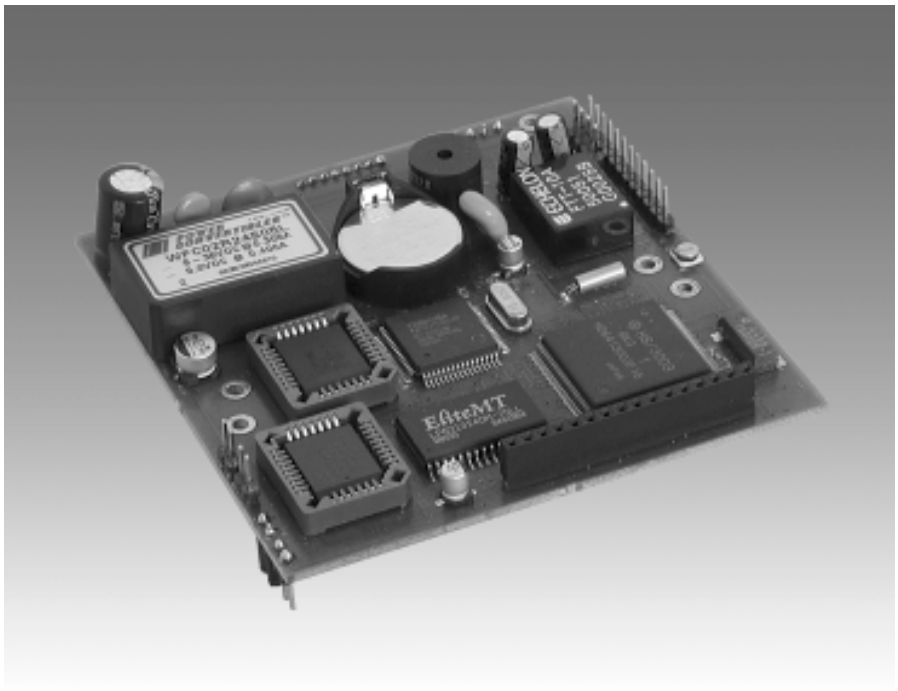
GLOBE 2000

The Globe2000 Integrated System is a LONWORKS-based solution, developed by Apice, to meet Security and Access Control management required in modern automated buildings. The system consists of Gate Controller Units, Identification Terminals, Data Acquisition Units, Field Database Management Units and Alarm Control Units. All these devices communicate over the LONWORKS network (EIA709.1) using the standard FTT10A Echelon transceiver on twisted pair media at 78 Kbps baud rate.



The basic Globe2000 Access Control System is composed of the Gate Controller IOL222, the Identification Terminal JLON and the LonServer Field Database Manager.

Identification data are captured through magnetic or proximity card readers connected to IOL222 or JLON terminals and are delivered on the network, where they are processed by the LonServer unit.

The LonServer checks the Field Database (FDB) stored in the on-board memory and sends appropriate commands to the Gate Controller to unlock the protected gate.

Every transit occurring in any of the controlled gates will be retained locally in the FDB until the alignment between the distributed FDB and the Local Database (LDB), stored in the Central Management Computer, is reached.

The alignment of the distributed FDB and LDB is ensured by the AxWin Access Control Software developed by Apice.

The system can be expanded with AN802 data acquisition nodes, specialised for security applications, and LonGuard Security Units, to implement a fully integrated open and interoperable LONWORKS-based solution.

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Motor driven valve actuator - The economic solution

These days, single room control is part of the necessary standard equipment in modern buildings. However, the quality of the regulation result is not always the best and this causes user dissatisfaction. Some reasons for dissatisfactory results are:

- **insufficient hydraulic calculation of the system**
- **badly parameterised controllers**
- **the selected regulating element.**

Lifetime

In most cases, the planner wishes to save costs and so opts for electro-thermic actuators and not for motor driven valve actuators. However, past experience has showed that the first downfalls with electro-thermic actuators appeared after only 12 – 15 months of running time. Around this time, the first thermic actuators become defect and cost-intensive maintenance is necessary. The initial cost advantage on the installation of thermic actuators becomes a cost disadvantage at the very latest when the first devices have

to be replaced – often such procedures cost several hundred Euro. The actuators´ lifetime is mainly determined by the controller setting and the system design. In the case of thermic actuators, lifetime amounts to approximately 36 months on average. By contrast, the lifetime of motor driven valve actuators is between 6 and 10 years.

Taking only this fact into consideration, in one life-cycle of a motor driven valve actuator, two thermic actuators would have had to be employed and at least one maintenance activity would have had to be carried out.

The economic solution – compact device MSA 120.2 ALL

Modern valve actuators are equipped with a number of functions which lead to higher control quality and which enable the system integrator to create an economic system. The new valve actuator, MSA 120.2 ALL, from the company ELKA-Elektronik GmbH can, for example, linearise the characteristic valve curve. In the past, some systems had higher valve strokes (6 to 10mm) to make use of a bigger linear area of the characteristic valve curve. Due to its linearisation function, the stroke of the MSA 120.2 ALL of 1 to 4.2mm is sufficient for applications such as temperature control via

- radiator heating
- floor heating
- fan coils
- ceiling cooling systems

Continuous regulating element

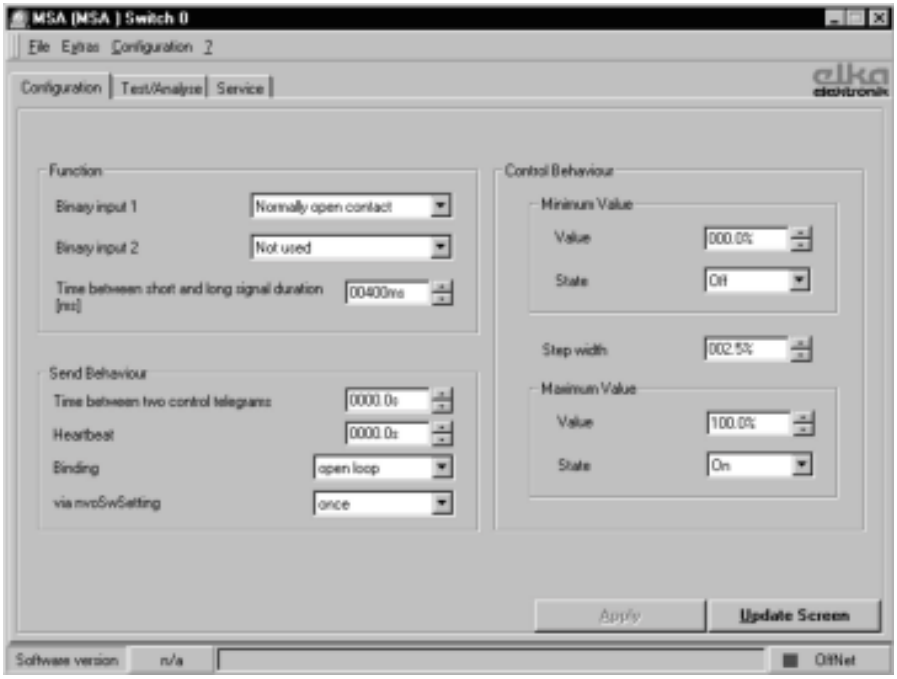
Thermic valve actuators have usually got a two-position control. By running the actuator with a pulse distance modulated signal (PWM), this regulation can be improved. However, due to the missing stroke feedback and manufacturing tolerances, a thermic actuator never can reach the quality of a continuous valve actuator.
The motor driven valve actuator from ELKA-Elektronik GmbH is a continuous controlling element with an internal setting regulator. It precisely analyses the current position of the valve via a digital measuring process and is then able to accurately run the position determined by the regulator. Via a network variable, this position, as well as the actuator´s status, can be made available for a superior Building Control Technology.

Close-off point detection

Another disadvantage of many valve actuators is the close-off point detection. The MSA 120.2 ALL uses a special algorithm to detect the close-off point. It prevents the use of the complete power of 120N and only takes as much as is necessary for closing. Thus, on the one hand, the death area at stroke detection is minimised and this decisively increases the regulation quality. On the other hand, the valve´s seal is also protected.

Automatic adjusting process

The valve actuator has got an automatic adjusting function which cyclically starts a routine depending on runtime. Thus, possible changes of hydraulic circumstances in the system, or hardening of the valve seal, are detected and the water circulation is guaranteed. The internal construction of the device and the method of running the motor guarantees a very quiet operation.
It is equipped with a LPT10-transceiver which enables an easy integration into LP/FT-networks.



Superior functions

Moreover, the valve actuator has got an override-input which can set the valve into a defined position, in case of maintenance routines, for example, or which can enable the Building Control Technology to override. An energy-OFF-function as a safety feature runs the actuator into a parameterised function. Furthermore, the valve actuator can additionally influence secondary aggregates, such as pumps, via an output in the format SNVT_switch, depending on the stroke.

Binary inputs

The motor driven valve actuator, MSA 120.2 ALL, has got two binary inputs for potential-free contacts. The inputs are supplied by the actuator and are completely autonomous switch-objects according to the LONMARK - standard #3200. The binary inputs, for example, can be used as a window contact and a dew-point sensor. However, it is also possible to use them for usual push-buttons and to execute functions such as dimming or sunblind control. In this way, local operating functions with inexpensive mechanical push-buttons in railing channels can be realised at a favourable price.

Combined heating/cooling controller is integrated

The valve actuator has got its own PID-controller which can be used as a combined heating/cooling controller. Its practical functionality allows temperature regulation via a Building Control Technology, as well as via internally programmable setpoints (comfort, standby, night mode).
Safety inputs, such as dew point or frost protection, are also available as user-defined inputs (occupied, standby, night mode).

LNS plug-in - Easy-configuration

All parameter settings are defined via an LNS-plug-in. For every single function, a service and diagnostic area is also available which eases operation of the device.

Summary

The MSA 120.2 ALL is an indispensable component for an economic solution of single room control. The high quality:

- internal stroke measuring,
- linearisation,
- close-off point detection,
- combined with extensive functionality:
- valve actuator
- 2 x switch object (binary inputs)
- PID-controller,

as well as the compact construction and the very quiet operation fulfil all requirements. Especially due to its speed and high functionality, the valve actuator is best suited for use in combination with fast systems, such as as cooling ceilings or fan coils, where thermic actuators lead to bad results because of the disadvantageous construction.

In spite of the numerous excellent characteristics, the MSA 120.2 ALL is offered at a very favourable price and thus should not be missing in any modern building automation system.

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New dimension in room management

Buildings are increasingly becoming equipped with high quality technology based on LONWORKS to guarantee an operation that is both economical and resource-protecting. Simple and useful operation concepts are necessary because rooms have to be easy to operate for the user despite the state-of-the-art technology. When choosing operating devices, aesthetic and economic considerations are of importance.

The LONWORKS bus coupling unit, in combination with standard application modules, presents a good solution. An important advantage is that the modules are already included into the standard product range of different switch and plug socket producers and harmonised with the corresponding design programs. However, in practice the following disadvantages frequently appeared:

- Not all modules were supported. The consequence was that modules were often offered whose application was technically impossible. The problem worsened if the modules had not been obtained from system integrators but from electrician fitters.
- The functionality of all previous bus coupling units was very limited due to the use of the Neuron® 3120. Thus, not every desired operation function could be individually assigned to the push buttons. As a consequence, the planning of a room operation concept was enormously limited. Frequently, the only solution was using several devices or a specially developed software.
- Changing one application module (e.g. push button sensor 1-fold in exchange for push button sensor 2-fold) led to a loss of all parameters and bindings.
- Setting into operation was quite difficult because plug-ins were not available.

Future is now

Using the new bus coupling unit, BA50 ULL, from the company ELKA-Elektronik GmbH, these disadvantages have become a thing of the past. The device is based on the Neuron® 3150 and has got enough possibilities to meet modern demands. Only one application program (XIF-file) is necessary to support all push button sensor modules from the companies Berker, Gira and Jung, as well as push button sensors with an IR-interface and the so-called 8-fold devices (8 push buttons / 8 LEDs). Thus, a higher functionality and flexibility is reached than would be possible when used within the EIB, for example.

LNS plug-in Easy configuration

Configuration is realised by use of an LNS-plug-in. First of all, the user selects out of a list the application modules according to their name , on the basis of producer or functional identification. Every supported module is listed there – confusion is not possible. Afterwards, the objects are assigned to the corresponding push buttons and LEDs. The following objects are available there:

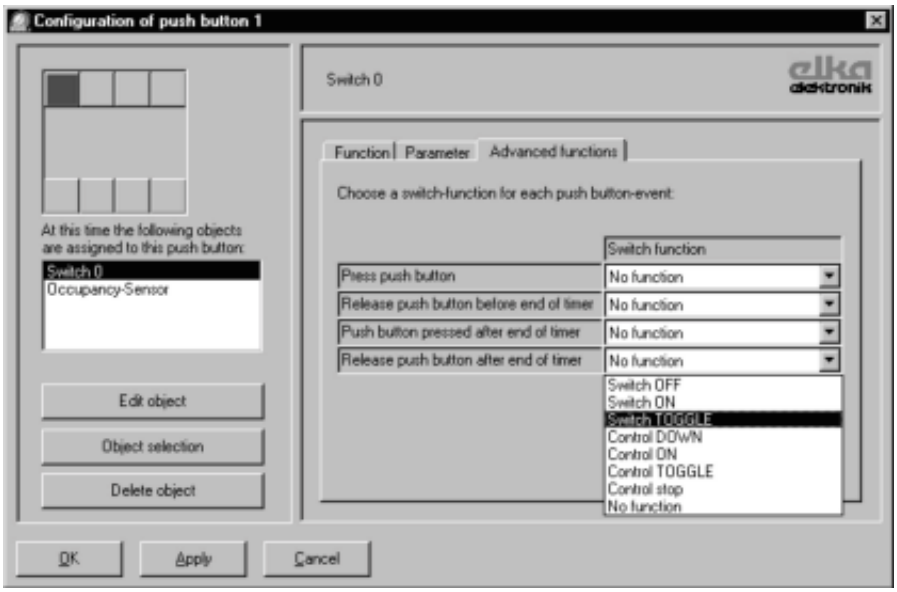
- 8 x Switch
- 1 x Occupancy Sensor
- 1 x Occupancy Controller
- 1 x Scene Panel

It is even possible for several objects to be assigned to a push button. This is, for example, necessary in the following scenario:
A room has got two light groups. Upon entering the room, only light group #1 should be switched on when activating a push button. If required, the second light group is added at another location. Upon leaving the room, the complete illumination is switched off when the push button is activated.

Each push button or LED can be parameterised individually. Due to the occupancy functions available, an occupancy button can also be implemented. The scene panel function allows scene retrieval and/or allows scenes to be saved.

Application-Library

The more functions and parameters that are available, the more time is needed for configuration of the nodes. This causes high costs - something that has



to be considered for each node of the project. ELKA-Elektronik GmbH can provide a solution. The configuration can be saved within an application library. Thus, the system integrator is able to reproduce tested settings and to thus work much faster. The frequency of mistakes is thereby enormously reduced.

The application library has got another advantage. If, for example, an operation function should be added at a control point - something that was not planned with regards to hardware - the application module has to be changed (for example, push button sensor 1-fold in exchange for push button sensor 2-fold). Here the plug-in offers the following possibilities:

1. Saving the configuration and setting of the 1-fold push button sensor.
2. Choosing a new application module (2-fold push button sensor).
3. Opening the configuration of the 1-fold push button sensor previously saved. Thus, all configuration parameters are available again.
4. Configuration and binding of new push buttons and LEDs – that is all.

All bindings are retained during the whole procedure. The device´s hardware is changed without lost of data. There is more freedom in planning when using this function, even during implementation, without having to resort to a completely new, faulty and time-consuming configuration.

Function editor

As a special treat, the system integrator has the possibility with the BA50 ULL device to generate new, not pre-defined, functions by means of the function editor. Thus, the user is free to implement operation functions. Project-specific solutions are no longer necessary.

Further applications

Of course the new bus coupling unit also supports the application modules “continuous controller” and “occupancy sensor”. At the moment, plug-ins are being realised to ease the application of these functions. Moreover, ELKA-Elektronik GmbH is developing a low-cost alternative to the previous continuous controller modules and this is available both from ELKA-Elektronik GmbH, as well as in other designs from the companies Berker, Gira and Jung. The modules can then be used as pure operation devices for heating and climate controllers and thus present economic solutions.

Result

The bus coupling unit BA50 ULL, in combination with the plug-in, is an efficient standard solution for realising a design-orientated room operation harmonised with the switch-/plug socket program. The system integrator can freely implement the desired functions without special project-specific solutions. ELKA-Elektronik GmbH offers solutions – from bus coupling units to package solutions such as the bus coupling units plus application modules from Berker, Gira or Jung.

In spite of its increased functional range, the new bus coupling unit is available at the same price as the 3120-based type and can be delivered from stock.

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Gipsy Makes Buildings Communicate

Building automation generates lots of data for its operation. Distributed sensors and actuators in a LonWorks network know about the status of each other. Everything goes without a hitch and the operator is satisfied. Satisfied? No! Although the functionality of the system does not require it, the user wants his control desk; he wants to know the state of affairs.

There is many a good reason for that. The proprietor of an estate asks for more than a smoothly running automation system: optimisation of the systems, reaction to unforeseen requirements (e.g. altered economical conditions of energy supply), preventative maintenance – in short, the means for remote monitoring and controlling. It is not just a matter of overseeing everything. Just think about the least cost router system in the telecommunications world: there is no reason why vital energy consuming systems in a building should not be able to react to the current prices of utility providers.

To express it more abstractly: an important automation task within facility management is to collect information and data from the different systems parts, to transmit them to a higher service desk, and, in the other direction, to receive orders from the control desk and to transfer them to the individual subsystems and components. Of course, this should not only happen problem-free across a single property but also across properties that are widely spread.

The technology to fulfil the task is well-known. Building automation generates the required data for its own operation. And Gesytec has the required devices – ready to use.

Com-Box à la Carte

Gesytec currently offers three devices matching the slogan, "Communication box for remote access and control." They can also be used for other purposes within facility management or building automation:

Gipsy Micro: embedded PC with limited I/O range (8 DI, 2 DO, 2 AI) and one serial interface

Gipsy Light: embedded PC with extended I/O range (24 DI, 8 DO, 4AI, 4AO), five serial interfaces, Ethernet connection and LonWorks interface.

Gipsy 2000 LE: embedded PC with serial interface, Ethernet connection and LonWorks interface.

In addition, the three devices provide a PCMCIA slot and can be connected to a communication network via analog, ISDN or GSM adapter, depending on the specific requirements. In other applications, additional memory or an Ethernet adapter (Gipsy Micro) may be helpful.

The Gipsy are sturdy and maintenance-free devices for connectivity and control tasks. As embedded PCs, they come without movable components that are susceptible to failure. The Windows® CE operating system offers real time capability and congruency to other Windows® systems in many respects; a decisive advantage in application development and for the communication mechanisms.

Designed for remote monitoring and control, the Gipsy embedded PCs offer, due to the TCP/IP interface and the implemented web server, the possibility to access building automation data via Internet/intranet. Gipsy 2000 LE is especially suitable for providing Internet access to the LonWorks network.

Gipsy 2000 LE, the LON-TCP/IP gateway, allows distributed systems to be established that are independent of each other with a standardised data transfer via OPC. This enables OLE-compatible programs to communicate with each other, as well as with other field buses, no matter where they are situated. What is not needed is a central control system that can easily lead to a bottleneck and even endanger the entire system from a single failure. Access to building automation data can, by means of a standard procedure, be facilitated via visualisation programs and/or commercially available PC office applications.

The PC functionality facilitates a broad variety of applications on the Gipsy boxes. Windows® CE represents a familiar environment to the Windows® developer, thus promising efficient application development. Moreover, Gipsy 2000 LE and Light offer the IEC1131-3 language range, and Gipsy Micro an IEC 1131-3 derivative as an additional programming

interface. Based on the Gipsy embedded PCs, numerous tasks in building automation and facility management can be realised by using the respective application software, e.g.

- Com-Box for remote access (telecommunication or Internet) by the operator
- Com-Box as a user-interface to building automation for information and individual settings
- Sub-station in building automation to connect the LonWorks network and further periphery
- PC for data capture and control
- Gateway and protocol converter for building automation
- Remote meter reading

Equipped with Internet/modem communication, different interfaces for periphery and field bus connection, PC capabilities, and running under a reliable operating system, the Gipsy embedded PCs make a large performance spectrum available for building automation and facility management.

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Diagnosis Tool Detects Any Problem within LON Network

Any interference with your LonWorks® network? Does a non-reproducible error occur repeatedly at irregular intervals? If yes, you need a tool to investigate the network and to record the situation accompanying the errors: the Easylon Analyzer from Gesytec. Designed as a mobile stand-alone unit, the analyzer is connected independently from a PC to the network where it continuously observes the network traffic. The moment you get back and connect your notebook, the analysis program displays the entire data traffic, both prior to and past the trigger event that you set. The access of the Easylon Analyzer to nodes and NV's is much appreciated by the service engineer while searching for and shooting errors. This provides the possibility to evoke problem situations and to test solutions.

The Easylon Analyzer can operate on any network by reading all node information from the net into its database. During operation, it listens to all telegrams within the net, records them and makes them available to the analysis program, displaying them as plain text, with node names and NV's. The analysis program runs on a serially connected Windows® PC . As generally not all information is of interest for error analysis, specific limits can be established by means of filters. In case of sporadic and hardly reproducible errors, the trigger functions are more than helpful. They record the traffic prior to and after a definable event, dependent on telegram type, content or communication relation.
The Easylon Analyzer can list all nodes, including their status information, as well as NV's. It also allows the setting of specific values. A consistency report displays the status of the individual nodes, checks for non-ambiguity of the subnet and node entries, as well as for the consistency of the NV's. Furthermore, the Easylon Analyzer allows insight into the diagnosis and EEPROM cells of the Neuron® Chip.

The Easylon Analyzer consists of a compact box containing the electronics to decode and translate LonTalk telegrams and a Neuron® with MIP software for network management tasks. It is equipped with a FTT-10 network interface and a EIA232 interface for PC connection, also allowing its use as a LonTalk adapter.

Peeking wanted? Sorry, there is no demo version but you can have a look at the user manual in the support area of Gesytec's website.

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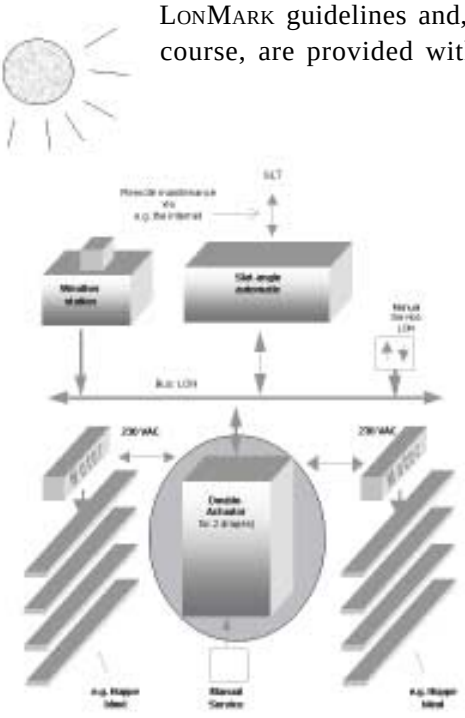
www.gesytec.de

Survey of the LON weather station & LON venetian blind actuators

The Hüppe Form company in Oldenburg, European-wide manufacturer of venetian blinds, awnings and roller shutters, is known on the bus scene as a competent sun protection specialist. Its new *Sunny*LON® modules leave all others behind. A well thought through concept has brought out a whole series of LONMARK-oriented LONWORKS devices such as :

- ***SunnyLON*-based actuators for different drive concepts (230 VAC/ 24 V)**
- ***SunnyLON* weather station, including weather sensors**
- ***SunnyLON* slat angle and sunblind position controller**
- ***SunnyLON* central processing unit**

All devices have been developed according to the latest LONMARK guidelines and, of course, are provided with a LONMARK-compatible LNS plug-in. (Free download under www.hueppeform.de).



Overwiew of a LON sunblind control. The sunblind actuator (double actuator) takes the leading part.

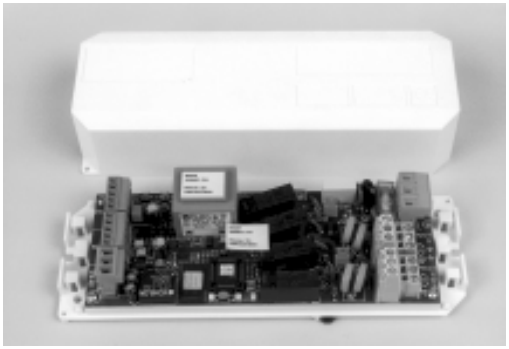
Using the SunnyLON weather station and the SunnyLON sunblind actuator as an example, this article covers the general practical knowledge about LON in the application of sun protection. It is directed towards users of LON such as electricians, planners and LON system integrators.

Why LON sunblind actuators & weather stations?

A high quality sunblind actuator not only controls venetian blinds but also awnings, shutters and other electromechanical systems for sun and dazzle protection. And it is especially the professionalism that counts here:

■ Controlling a venetian blind is more complicated than controlling a shutter or an awning. A venetian blind cannot only be moved UP and DOWN and be stopped in interim positions but also the slat angle can be adjusted.

■ The motors used, mostly 230 VAC asynchronous drives, are very resistant but, from an electrical point of view, very aggressive. Switching them on and off, as well as changing the sense of direction, can cause very high voltage peaks and, due to these, electrical fields arise that have knocked out classical LON binary outputs for 230 VAC. A high quality sunblind actuator therefore includes special protection circuits to prevent these damages and the consequential damages of the motor and itself.



***SunnyLON** multi-talent: double actuator for 2 pieces of 230 VAC sunblinds / awnings of all variants*

■ Some motor manufacturers for sun protection have recently expressed the requirement for a switchover time with a minimum of 500 ms, and the sunblind actuator has to take this into account.

■ Some sunblind actuators have their own ”secondary inputs” for the direct connection of commercial push buttons. This is in order to reduce the expenses of LON bus push buttons. However, depending on the manufacturer and type of the sunblind actuator, this feature takes its toll on the flexibility of the LON system. Note: not every ”secondary input” allows the binding to another LON actuator and thus can only control its own sunblind.

■ An increasing number of sunblinds, as for example some ”daylight deflecting sunblinds”, are driven by more than one motor, which again can have different operation voltages. Modern sunblinds with two to four motors with 230 VAC and 24 VDC are used as well. The reason for this is the demand for low noise and creep speed tilting of the slat, as well as for particularly thin venetian blind types fitted in the window frame.

Daylight deflecting venetian blinds, for example, are mounted in the interior because of construction reasons and in order to reduce cleaning efforts. On the other hand, being mounted on the inside increases their audibility and could bother the user or disturb the working atmosphere. Meanwhile, there is even an EU recommendation about the maximum noise level in an office workplace.

■ Modern sunblinds not only protect from the sun, but also deflect the light into the rear of the room in order to attain its natural and regular illumination. This is achieved by means of special control of reflecting slats. The new EU recommendation defines minimum brightness and maximum light density. There is an enormous potential for saving electrical light. Due to this, daylight deflecting venetian blinds are being used more and more often, especially in commercial buildings.

■ Daylight deflecting venetian blinds: to prevent dazzling by the deflected light, the slats are adjusted following the current position of the sun. This requires the highest precision from the sunblind actuators and the correct adaptation to the motor and the mechanism of the venetian blind. Some sun protection manufacturers offer suitable venetian blind actuators to go with their products to be able to ensure that the venetian blind has smooth combination of actuator and daylight deflection.

The meteorological sensors for sun protection are a wind sensor, a rain sensor, a frost sensor, a twilight sensor and a sun sensor for recognition of dazzling. Furthermore, a LON scheduler for daily and weekly repeating functions, or a PC-based LON sunblind management system for the co-ordination of weather sensors and slat angle tilting can be useful. A sunblind actuator should come with the according LNS plug-ins.

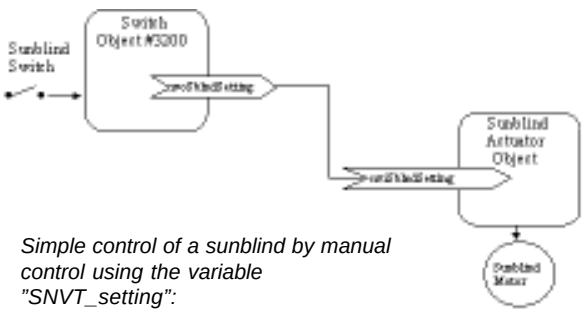
Other intelligent sunblind control features

■ The slats of all sunblinds can be adapted to the current position of the sun by only one LON slat angle control. Of course the geographical location of the building and its façades are considered.

■ Are your PCs on a network? Supported by Hüppe PC client software, the sunblinds can easily be operated from every PC workstation by every employee.

■ Quick help: faults are localised and logged by the LON actuator and may be reported to the Building Management System (BMS) - also by fax or mobile phone (SMS).

Since the most important control of a sunblind, awning or shutter is the manual control, it is outlined in the sketch on the left:



Simple control of a sunblind by manual control using the variable "SNVT_setting":

1) Control of a sunblind by manual control using the variable "SNVT_setting": Definition SNVT_setting:

Within LON, the typical control of a sunblind by manual control is implemented by the standard network variable "SNVT_setting" and is described more closely as follows:

Name of variable	Type of variable	Description
NvSblndSetting	SNVT_setting	Input for manual control

Table 1: Variables for manual control input

The meaning and structure of this input variable "NviSblndSetting" is defined as a LONMARK standard network variable type "SNVT_setting".
The SNVT list can be called for at www.lonmark.org at any time.

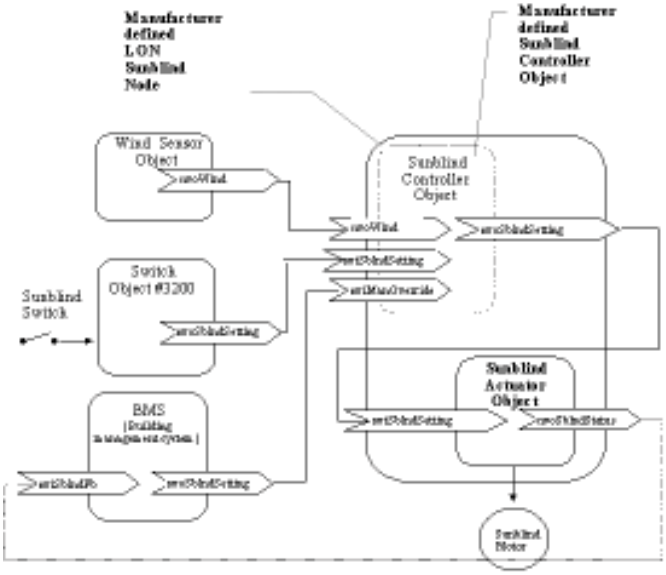
2) Extended functions of a LON sunblind actuator:
In addition to the manual control, the LON sunblind actuator can be controlled by many different other inputs such as heating, ventilation, etc.

Note: The number and functionality of the extended functions depend on the manufacturer of the actuator and should therefore be considered carefully during the planning period.

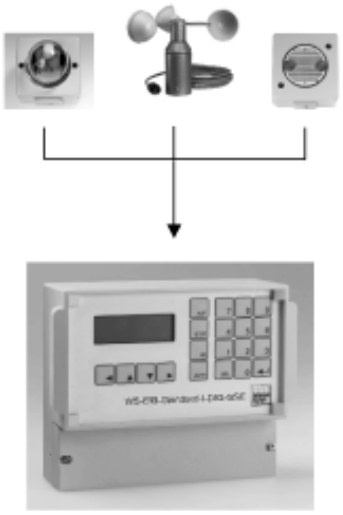
Name of variable	Type of variable	Description
NviWind:	SNVT switch or SNVT speed	Input wind supervision
NviManOverrid:	SNVT setting	Input for override by a system of overriding importance (e.g. Building Management System "BMS")
NvoSblndStatus:	SNVT setting	Feedback about sunblind position and, if necessary, slat angle

Table 2: Variables for cross functional control inputs

This is outlined in the following sketch:



Advanced control of a sunblind by manual control using the variable "SNVT_setting":



weather station (evaluation)

sun wind & rain sensor with weather station & LON interface

Sunny LON: 25 channel weather station & slat angle sunblind position controller (LH-BHA) & scheduler

This weather station is the **ideal choice for commercial buildings** with many façades or façades partly shadowed by neighbouring building parts, for it can control up to 25 differently characterised sunblind groups.

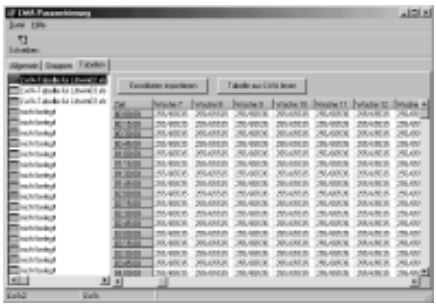
Integrated LON binary inputs for weather sensors.

From one or two heated wind sensor relay contacts, up to four adjustable wind alarm limits can be processed. The unique sun dazzle sensor works out the position of the sun by comparing the brightness of the northern and the southern parts of the sky. The assignment of the information to the different parts of the façades allows high quality dazzle protection. Due to this, ordinary sun sensors, mounted at every façade measuring the brightness hitting that single façade, are unnecessary. The heated rain contact reliably protects all awnings from early ageing and becoming dirty. A combinable heating contact, mounted in the building, allows the sun protection to play a big part in the passive exploitation of solar energy.

The integrated room slat angle & sunblind position controller (LW-BHA) adjusts groups of sunblinds or awnings to the current position of the sun:

- The slats of every venetian blind are adapted to the position of the sun, i.e. maximum daylight in the room with optimum shading.
- The sunblind moves down only as far as necessary for dazzling protection, ensuring an undisturbed outside view.

In the slat angle sunblind position controller, the sun position and the sunblind characteristics of up to 25 groups of sunblinds, can be saved (= max 25 LW-BHA tables). In a LON network, several units can control sev-



LWA configuration: *The control table of the slat angle sunblind position controller: for each week of the year, a slat angle (for venetian blinds) or sunblind position (for sunblinds & awnings) is stored with a raster unit of 15 minutes.*

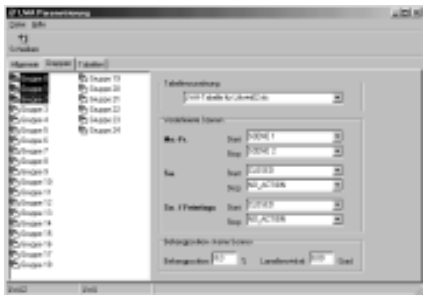
eral hundreds of groups. The high temporal resolution of 15 minutes allows an excellent control of daylight sensitive façades and rotary slats.

In combination with Hüppe LON sunblind actuators, the slat angle & sunblind position controller is perfectly suitable for all types of sunblinds and awnings. This includes the control of intelligent electronic motors with 230 VAC and 24 VDC that allow adjustment of the slat without inconvenience to the user (low noise, creep speed slat movement and, due to this, no sudden light changes).

Included in the price of the controller is the calculation of the sunblind position data, specific for each building, depending on the current sun position, the geological location of the building, the direction of the façade and the sunblind characteristics. The calculated slat angle and sunblind positions are available for the customer as a Microsoft Excel® file and can be stored directly into the controller. Due to this, there is an open interface so the customer can modify the tables easily at any time without specific LON knowledge.

There also is an integrated scheduler function that automatically takes legal public holidays into account. It is possible to program several switching times each day in order to achieve a homogenous light deflection into the room.

- If there is no need for the functionality of the slat angle position controller, the customer can employ the controller for easy photocontrol of up to 25 façades, or parts of them (different directions). This is very useful, especially for modern buildings with many corners and angles, or buildings shadowed by neigbouring blocks.
- It is possible to download a LONMARK compatible LNS plug-in from www.hueppeform.de. Here, the whole configuration is shown on a few PC screen shots. The plug-in may be tested even with an ”empty” slat angle sunblind position controller (without an Excel table).



The integrated scheduler can manage several switching times for each of the 25 groups and automatically recognises public holidays

If even more user-convenience is required, the shadowing calculation of neighbouring buildings can be included into the Excel tables of the slat angle position controller (The direction of the façade and windows and the geographical location of the building are taken into account).

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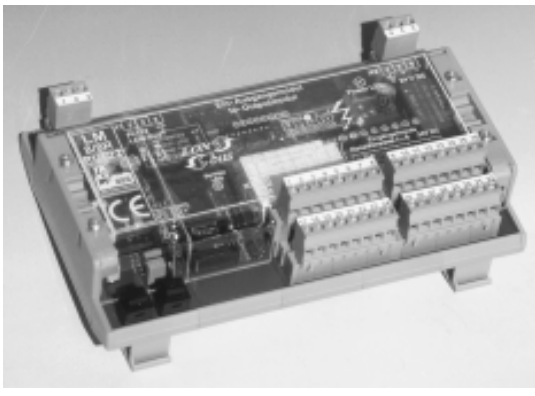
New telecontrol module for long-distance data transmission

Unitro Fleischmann has extended its range of products with a new module for data transmission using the PLT22 LONWORKS system. It has some outstanding system features:

- Compact snap-on top hat rail module
- 8 digital inputs of 18 – 30V DC
- 8 potential-free outputs to max.250V, 5A
- 2-pole I/Os leading to plug-screw terminals.
- Secure data transmission using the binary phase shift conversion with frequency switching on the 125-145 kHz C band, with a transmission rate of 4.8 kB/s.
- Two-wire transmission of up to 15km without extra router PL230V/400 V with network coupler Standard software with deliverable plug-ins

The new modules were first successfully deployed in a chemical company for the tele-control and tele-monitoring of 18 gas alarm warning signs.



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LONWORKS-based Airflow Machines from THEN GmbH shipping worldwide

German Infranet Partner, TLON GmbH, were involved in the concept, design and implementation of a control system that is totally decentralised.

Decentralised object-oriented automation technology

In order to satisfy the demands of decentralised intelligence, a concept was developed that is based on a clearly delineated object furnished with a well-defined interface. In this concept, an object is a software part that can be divided into the following categories: sensor object, actuator object and a control object. The control object, due to its functionality, can be subdivided again into three levels: the machine function, the process function and the control function.

The objects distinguish themselves through their reuseability, among other features. Thus the valve actuator object is implemented in every valve for the control of the I/O level, whereby special hardware features are accommodated by means of configuration. Likewise, the temperature regulator object is implemented several times for various machine components.

In diagram 2, the interplay between the individual objects can be seen. Here it can also be clearly seen that "binding" the objects can alone modify the functionality of the equipment. In this way, freedom to create additional configurations within the system concept is provided. By means of this decentralised intelligence, some new possibilities are created. Amongst other things, new monitoring possibilities can be implemented locally. In this way, the temperature sensor itself checks the plausibility of the measurement reading, or the valve diagnoses, where required, any necessary maintenance work based on the running time and the switching cycle. In this way, "preventative maintenance" is made possible. Furthermore, independent subsystems are formed that prevent a total system breakdown when a failure occurs in part of the system – the "keep on running"-functionality. Similiarly, the test and simulation possibilities are improved and the conditions for system expansion optimised.

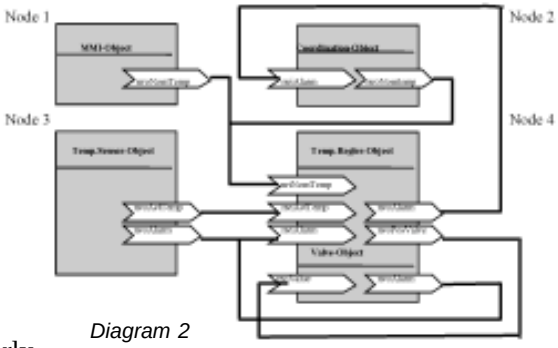
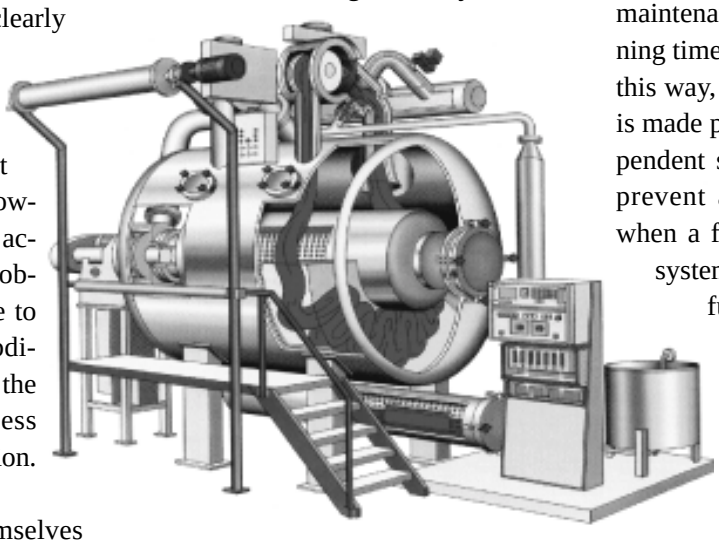


Diagram 2



Modular equipment concept

Only by consistently applying the notion of decentralised automation can a modular equipment concept be realised across the whole system. For this, machine construction, pneumatic and electrical configuration and the control concept must be closely linked. As an example of this, one can look to a concept already realised by the company THEN GmbH. In the equipment modules there are, among other features, one or more additional containers that can independently carry out functions. Due to the mechanical construction, there are now clearly defined interfaces between the residuary equipment and the additional con-

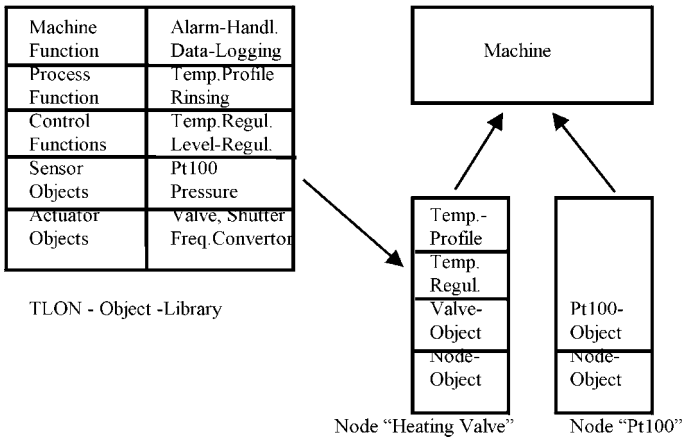


Diagram 1 shows how an automation task is realised from existing objects

tainers. Likewise, there are also header strips on the pneumatic and electrical side in order to be able to separate these equipment modules. As the software now runs decentrally, this part can function independently. In this way, THEN is in a position to produce and test various equipment parts completely (mechanical, pneumatic and electrical). Consequently, a make-to-stock production is made easily possible without additional expenses.

Tele-Service integrated in the system design

Through years of experience in the difficulties of organising tele-service worldwide, the decentralised intelligent automation concept of the company TLON, from the design phase onwards, is designed to be able to deal with tele-service without limitations. Via a telephone line, a comprehensive diagnosis can be generated directly with a PC, locally or at the service point. Each sensor and actuator can be monitored and given new parameters. It is also just as possible to transmit a software update via a telephone line directly into the equipment and to immediately check the new functionality online. No special protocols need to be created; only the information exchange of the equipment-specific application needs to be defined.

The LonWorks integration tool used in the project is Pathfinder (LNS based) from TLON GmbH. Pathfinder is well-known in industrial applications. Tootsie 100 (Toolkit for System Integration) was very helpful during the commissioning and maintenance phase of the project. For more success stories using Pathfinder and Tootsie 100, read the "Helsinki story" and the "Maersk Data story" / pp 31-32.

Sensors and Actuators used

Pressure sensor	Endress&Hausser
Temperature sensor	TLON
Flowmeter	G&F
Differential Pressure	Rosemont
Level sensor	Endress&Hausser
Pneumatic flaps	Keystone
Pnuematic Valves	Gemü
Pnuematic Regulating Valve	Schubert & Salzer
Frequency Inverter	KEB
M12 IP 54 Cabling System	TLON
LPI Power supply	Estec
Pnuematic	SMC

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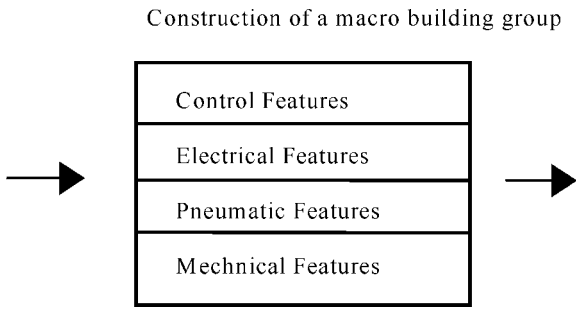


Diagram 3

LON Multisensor: Multiarcon

Normally, multi-sensors are used for detection of several measuring features from one central point. These sensors are a combination of motion-detectors, light and temperature sensors as well as integrated controllers. All data is available to the network for further processing by means of a LON module.

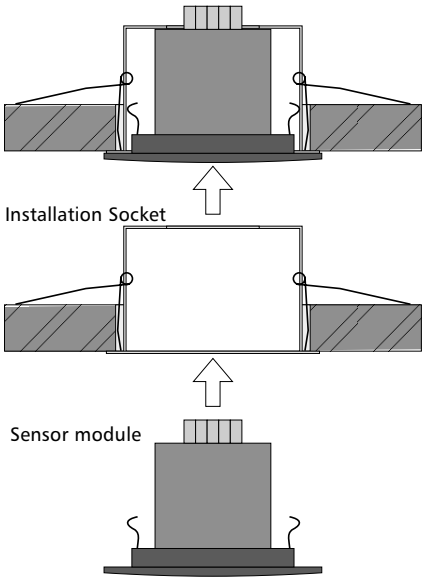
Thermokon multisensors are specially designed for installation in intermediate ceilings. Thanks to a flat ceiling installation ring, an unobstrusive and optically neutral integration is ensured, ideally suiting the room interior.

A robust installation socket is used for mechanical protection of the sensor module. The multi-sensor can be easily inserted or extracted; thus saving time and efforts required for mounting and maintenance.

The PIR presence indicator detects room occupancy. This kind of information is available for further processing via the network. If required, the detection range can be enlarged by means of further passive Thermokon multi-sensors, and connected to the LON junction like an extension. Saving further junctions makes this a profitable solution.

Thanks to light detection in the range of 50-5000 Lux, the light detector offers the possibility of illumination control, depending on daylight in rooms, offices etc. In connection with a presence indicator, you will achieve an economic illumination control. The respective room temperature is detected via the temperature sensor. This data is available via the LON interface.

Installed multi-sensor



There is the possibility for direct intelligent processing of the information delivered by the PIR presence indicator, and the light and temperature detectors, via application software with multi-functional regulators, e.g. for HVAC control processes.

Digital inputs for zero-potential contacts are used for example for recognition of window contacts and/or condensation controls. The recorded data can be processed to influence the HVAC control functions by means of software applications.

For further information, please request our detailed technical documentation.

Technical data:

- Output: LON module, output is made via standard network variables (SNVT)
- Inputs: 2 digital inputs for zero-potential contacts (e.g. window contact and condensation control)
- Housing: ceiling installation ring available in colours white or chrome
- Detection range: circular with a diameter of 7.5m at an installation height of 2.6m
- Light intensity: 50-5000 Lux, with integrated colour correction filter (visible radiation)
- Temperature: PT1000, measuring range 0…+50°C
- Neuron: 3150, 32K EEprom, downloadable
- Transceiver: FTT10A, free topology
- Precision: ±0.5°C

Housing variants:

- Variant LON-1: presence indication and light intensity detection
- Variant LON-2: presence indication, light intensity and temperature detection
- Variant LON-3: presence indication, light intensity and temperature detection as well as triple multi PID regulator

(Note: Variants 1 and 2 are also available as passive and active sensors.)

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Put it in Your Own Hands!

System integrators know the story: an extensive network was handed over correctly configured. Nevertheless, it still does not do what it should or is unreliable. Where do you go from there? Does the root of the problem lie in faulty cabling? Are all modules really accessible across the network? How does the network behave under increased bus load? Are the configuration parameters also correct? Are the NVs and NCIs properly set?

Questions upon questions that cannot be answered, or be satisfactorily answered, by current PC-based tools for the configuration of LON networks. In addition, the use of a laptop is not always practical. Mostly, after a short time, the battery becomes low and a socket is nowhere in reach. All installers possess a multi-meter in their basic equipment. Why not also one for the LONWORKS network? With the ALTO*handheld*, a "LON-Meter" is available that enables installers to check the functionality of LON installations directly at the installation phase. It is also possible for them to ensure that:

- The modules are all accessible across the network, that is, that the network cabling is correct
- The inputs and outputs have been clamped as designated. The installer can, in this way, take away some of the system integrator's work in starting up the network by eliminating possible faults and by pre-checking the network.

After implementing the equipment, there is no need to call out an engineer if a module has a faulty electrical function in the I/O components. With the ALTO*handheld*, a technician can carry out an exchange of modules without causing the equipment to dysfunction. With the same device, engineers can also test whether, for example, the problem is caused or will be caused by the bus load being too high or whether the configuration parameters are correct, or not. It is possible both to extend the standard functions of the ALTO*handheld* by means of the module-specific plug-ins from the module manufacturer, and also to conceal the standard functions. Through these means, the device can cover a wide range of applications.

For the programming of these plug-ins, a development kit is available to the device manufacturers with which the functionality of the device can be extended rapidly and easily and tailor-made to specific requirements.

What are the main features of the ALTO*handheld* ?

- *16-Bit Micro-controller* with maximal 1 MB RAM and 1 MB Program-Flash.
- *Standard-Transceiver FTT10A.* The device is also optionally available with the CNS-Radio-Transceiver (433 MHz) or the Transceiver TP/XF78, TP/XF1250, RS485.
- *12 Hours Battery Operation.* With the integrated Power-Management, this time can also be extended.
- *Grafic LCD-Display.* The user interface with GUI elements, known from Windows®, enables simple operation
- *Alphanumeric keypad with 45 keys, including 10 function keys.* With the function keys F1-F10 and their secondary allocation, functions can be retrieved quickly and directly.
- *Serial RS232-Interface.* With the relevant PC functions included in the delivery of the device, software updates or images of new module applications can be downloaded via the serial or LON interface (for later downloading into the module). The interface could also be used for the import and export of network data in the LNS database (currently not implemented).
- *Comprehensive LON Functions*. With the standard device set-up, both simple and complex functions are available for accessing modules in LON networks. This enables diagnostics, maintenance and problem solving.
- ***Interoperability.*** The ALTO*handheld* has been developed to comply to the LONMARK Interoperability Guidelines 3.2.

Which functions does the standard version of the ALTO*handheld* provide?

(1) Reading in Module Information

■ After receipt of Service-Pin-Message
■ After automatic network recognition of the complete network or parts of it
■ After manual input of the Neuron® ID

(2) Displaying/Modifying Module Information

■ Display of Neuron® ID, program ID, Neuron® type ...
■ Display/modification of location text, channel ID...
■ Display/modification of domain table entries (length, ID, subnet/node...)
■ Display of the complete address table entries, modifications of the timeouts, retries
■ Display of the NV tables (fixed + configured, self-documentation)

(3) NV Monitor

■ Addition/Removal of NV's out of the NV table to/from the NVmonitor.
■ Display form 1 - NV monitor in list format
■ Display form 2 - display of the NV monitor in detailed presentation (structures are interpreted according to SNVT.TYP)
■ Display/modification of the NV data on the NV monitor

(4) General Management Functions

■ Modification of the module status (online, offline, unconfigured...)
■ Cyclical reading/re-setting of the Neuron®'s fault status information
■ Sending of the wink command for localising modules
■ Re-setting, re-starting the application
■ Re-initialising of the entries in the domain, address and NV tables to their default values.

(5) Extended Management Functions

■ Fault removal – module exchange with transfer of the network information
■ Fault search – measurement of the bus load, production of additional traffic on the bus
■ Application download – loading of NXE files downloaded via the serial or LON interface onto the ALTO*handheld* into the modules.
■ SPA Interface – Device operates as a serial LON interface with the proprietary serial SPA protocol (for example, it is usable with the Sysmik's Freeware Windows® programmes ALTO*route* and ALTO™).

Some Examples of Application

(1) Functional tests before the configuration phase

■ All modules are read in one after the other via the Service-Pin-Message or via manual input of the Neuron® ID. In so doing, the individual channels should firstly be tested, followed by the communication via routers/repeaters.
■ The modules can be localised using the wink command. Modules receiving this message typically react by flashing LEDs. This feature is especially useful when the Neuron® ID has been typed in.
■ If modules possess no local service element for test purposes, these modules should be checked through the display and modification of the corresponding NVs in their I/O functionality.
■ Modules that have been checked can be "marked" through the setting of a corresponding location text.

(2) Function Tests during the Start-Up Phase

■ After the network has been configured, it is sensible within the start-up phase to measure the bus load of the channels and, by means of well-directed load-increases, to simulate the possible effects on the total behaviour.

■ Through cyclical reading of the error statistics in the Neuron® chip, both application as well as network-specific problems can be recognised in good time.

(3) Diagnostics, Maintenance and Repair in Running Systems

■ In the case of problems that are caused by the faulty behaviour of I/O components (switches, relays...), the I/O functionality can be checked anew through the display and modification of the corresponding NVs.

■ With respect to their I/O components, faulty modules can simply be replaced with the help of the module exchange function.

■ The reading of the node´s error statistics and measurements of bus load are also helpful functions in running systems.

Development of Individual Plug-in's with the Design-Kit

For the development of plug-ins or completely new applications, a design kit is available to the programmer that contains the libraries for accessing the firmware (BIOS) functions and the GUI functions/objects of the event-oriented object manager, as well as comprehensive example applications. The functions for accessing the network use the ALTO*ifc*-API from SysMik. This is also available as a 32-Bit Windows®-DLL.

The GUI contains pre-defined objects for the presentation of control elements, familiar from the Windows® world, such as function trees, toolbars (with 16 x16 icons), list boxes, radio-buttons, check-boxes, push-buttons and message boxes. The application consists of resource files that contain all texts, graphical elements, menus and dialogues, as well as event functions that the object manager needs for the handling of dialogue control elements, menus and LON events. The text resource can simultaneously contain up to 3 languages. Currently, the BIOS supports German and English. By adapting the symbol table in the BIOS, however, other languages can easily be implemented.

Although an application is written in ANSI-C, the object-oriented software concept allows principles of object-oriented programming to be used. It is easily possible, through derivation from existing object types and overwriting of methods, to adapt the appearance of objects according to individual requirements and yet to still inherit the other features. The BIOS functions are called up via a jump table so that future improvements and further developments of the BIOS have no influence on the application.

Announcement

The standard functionality of the ALTO*handheld* will continue to be developed in a way that is targeted towards the wishes of the user and that is based on SysMik's experience in system integration. Try out our ALTO*handheld* on loan in your project. At LONWORLD™ 2001 in Autumn in Frankfurt/Main, a completely revised version, 3.0, will be introduced to all end-users and interested parties. This is a version that will, in particular, support SCPT's and LONMARK objects.

Summary

The ALTO*handheld* is the leading product for mobile network implementation on the German market. User-specific versions for leading companies in the German automation market are in the end phase of their trial periods and the feedback from these companies will contribute in the near future to an even wider spread of these easy-to-use and very efficient "LON meters".

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SysMik delivers XILON-Service-Handhelds to Honeywell Home and Building Control

On 1 March 2001, a long-term contract was signed concerning the delivery of SysMik-Service-Handhelds to Honeywell Home and Building Control. Honeywell will integrate this equipment, under the name "XILON", as a mobile service tool for the implementation and maintenance of LonWorks networks for the "Excel Smart I/O" product family. With XILON, the technician has a robust and efficient Handheld to examine electrical bus installations, to test the basic functions of the I/O-modules and to perform diagnostics. With this tool, the ability to bind networks is not the primary goal. More important for the technician are the abilities to check the equipment's wiring and electrical functions or to manually position the equipment. However, even LonWorks experts often need their mobile "NODEUTIL". The Honeywell devices in the "Excel Smart I/O" range are currently being LonMark certified and the XILON has been developed to comply to the LonMark Interoperability Guidelines 3.2.

XILON is based on the SysMik ALTOhandheld. Honeywell tailored it to their specific needs. The product's key features include more than 10 hours operating time with accumulator buffering, a high-contrast LCD graphics display, as well as an alphanumeric keypad and a serial RS232 interface. It was, however, the integrated Plug-in interface that rendered the equipment especially appealing to Honeywell: With the Design-Kit, aimed at rapid application development, the programming of module-specific plug-ins becomes child´s play. Honeywell implemented XILON-plug-ins for its own product group. This allows a very intuitive graphical presentation on the display of, for example, the switching status of the "Excel Smart" I/O channels. Through this, a further important step has been taken towards simplifying the implementation of interoperable LonWorks networks by system integrators and technicians.

More information on the ALTO *handheld* can be found in the article in this publication on pages 56-58 or at: www.sysmik.de

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LonWorks® training for system integrators, installers, operators and consultants

Using LonWorks technology, cross-industrial communication and control solutions can easily be realised. To make use of all these benefits, the people who are involved in the different phases of a building's lifecycle have to meet the new requirements.

With the foundation of the Infranet Academy, Honeywell, TLON, Dresden University of Technology, SOMFY and Philips are meeting the target to offer LonWorks training sessions to further establish this future-proven technology in the market.

The training sessions will quickly enable system integrators, installers, operators and consultants to gain understanding in how to design LonWorks networks.

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Training laboratory in the Dresden University of Technology

K. Kabitzsch / G. Stein / V. Vasyutynskyy

A toolset for stress test in field bus systems

Dead time effects in overloaded field bus systems

As controls and automation become more distributed and integrated, industrial communication networks and buses are becoming more crucial. The left illustration in Figure 1 shows a simple example of a distributed control application, consisting of two IO-devices and one controller-device. In a complex control application, many such subsystems may work side by side. The overall network performs a complex control application, such as running a manufacturing line or automating a building.

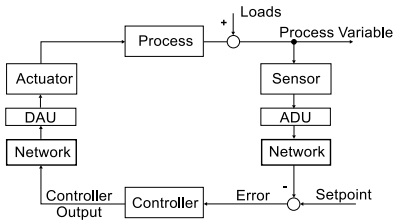

Figure 1: A simple example of a distributed control application and the corresponding schematic of a standard feedback controller circuit

Field buses are optimised to exchange periodic data and short messages. However, all devices are interconnected by a common network. That means some devices share the same network-media. It takes the responsibility of a good network design to avoid network overload. Overload situations in an existing network can become obvious in stochastic errors. The right illustration in Figure 1 shows the schematic for the simple example of a distributed control application already introduced. It's a standard feedback controller circuit. However, inside the circuit, the network components are included (marked with strong borders). Depending on network overload situations, these components can cause dead time in a stochastic manner. As Figure 2 shows, a normal control process represented by the graph in the left diagram could show instable behaviour like that in the right diagram because of dead time [1].

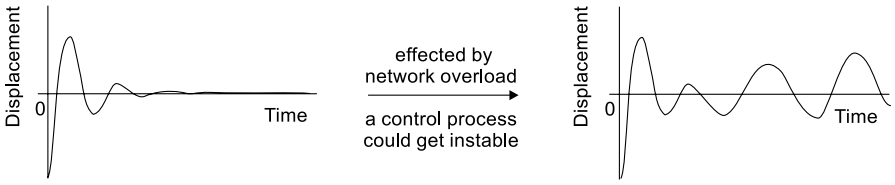

Figure 2: A normal control process (left side) becoming instable (right side)

Stress test

The utilisation-degree of a network is difficult to decide. Especially in building automation, the networks are characterised by strong non-linear behaviour of a large amount of devices. Due to this, a calculation for network utilisation is often impossible. Other methods for overload protection, like establishing adaptive priorities and so on, are not applicable in automation networks [1,13]. Therefore, the reliability test of existing networks is very important.

A stress test is such a reliability test for determining the behaviour of the distributed subsystems in the network under harder traffic conditions. The basic idea behind the stress test is to generate additional network traffic in order to provoke network overload, as well as to check the behaviour of the connected subsystems under those circumstances. Complete stress test equipment consists of a network load generator, a protocol analyser for recording the effects and a tool for the evaluation of the recorded data [6]. At the Dresden University of Technology, a stress test tool set for Local Operation Networks (LON) has been developed.

For evaluation, we were able to use an existing tool, called Extrakt [8]. It was also developed at the Dresden University of Technology and assists the user in the evaluation of event lists. For storing und visualisation, the spread-sheet program Microsoft Excel was used. Extrakt makes it possible to search, sort or filter large data quantities. It is well-suited to the evaluation of data with temporal reference [9]. Protocol analysers are already available for LON. The traffic generator was developed by us. Figure 3 shows the complete stress test tool set, with Extrakt as the evaluation tool and a device called Traffic Generator for generating network load.

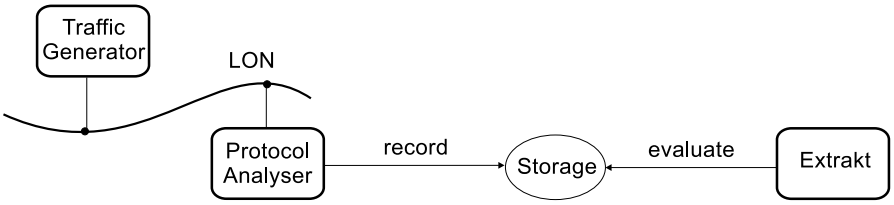

Figure 3: Stress test tool set for LON

Traffic Generator construction and function

With a single LON device, it is not possible to sufficiently generate traffic. Several devices are therefore required. The more devices that are used, the more realistic the time-behaviour is. The basic idea was not to strictly define the device-number, but to ensure that the Traffic Generator was automatically capable of extension. The advantage of this is that additional devices can be inserted according to demand.

The Traffic Generator consists of a plug-in which runs with a LON network management tool with Windows, one master-node and one or more slave nodes. A plug-in is a special control extension for the network management tool to provide a user interface for the configuration of a LON device. The master device receives the commands from the plug-in and controls the slave devices. Figure 4 shows an example with three slaves.

The master node communicates with the plug-in for receiving the settings which were defined by the user and for sending status information back. The settings are sent to all slaves. These devices create the network traffic depending on these settings. The Traffic Generator configures its functions automatically. It checks by itself if slaves are available and, depending on the result, the plug-in offers the matching functions. At the moment of initialisation, the plug-in reads the current state of the Traffic Generator nodes and initialises the plug-in values. If there are no slaves available, the master takes over the part of a slave and generates broadcast messages. The definable parameters are constant transmission intervals of packets from 5 to 500 ms, user defined variable transmission intervals of packets and packet size from 1 up to 100 bytes, plus protocol overhead. If slave devices are available, the user can define the service type of the transfer (e.g. acknowledged or unacknowledged). It is recommended to use at least one slave node to utilise all the built-in functions of the Traffic Generator. The Traffic Generator creates user-defined explicit messages in order to reduce the available bandwidth of a LON channel. The user can choose constant or variable transmission intervals to simulate a statistical allocation function. These intervals are saved in simple text files which can be edited by the user. Constant transmission intervals can be defined in the plug-in by moving a slider or be typed in. Adjusting the packet size uses the same control features.

Normally, three LON devices are sufficient to generate network overload in a realistic manner. In a version with three devices, the Traffic Generator has already been successfully brought onto the market by the company TLON.

Test of components in a test bed

It is necessary to test the components of a large LON network at the earliest possible date, even if the other parts of the LON network are not ready yet. The Traffic Generator can simulate the network traffic of the missing components. It is connected with the other components in the test bed and generates the specific behaviour of the missing components. Afterwards, the real time performance of the system under test is measured. The results can show if the additional traffic of the missing components could cause an inadmissible extension of transaction times of the tested components.

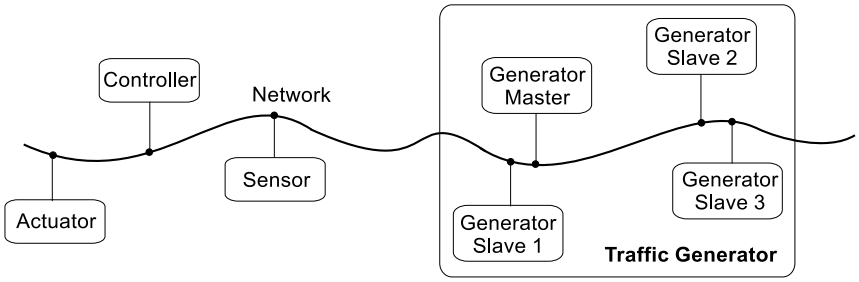

Figure 4: Traffic Generator with one master-node and three slave-nodes

Figure 5: Response time measurement

Figure 5 shows an example of a test network. The response time is plotted in relation to the transmission interval. There are three graphs given for the measured minimum, maximum and average values of the response time. At a specific point, that response time increases dramatically. So it is also possible to simulate a worst case condition which can occur due to transfer trouble or a vast number of alarm messages caused by a general error.

Test of existing systems to their expanding capabilities

Upgrading an existing system requires additional functions and therefore additional network traffic. The question is if the LON network can handle the additional traffic without any reduction of the existing and the new functions. If this test fails, it is necessary to install new routers and cables. Additional network traffic can cause longer packet delay or packet loss in the existing or new part of the network. An application which has worked without errors so far can come into trouble now. In order to find out the enlargement reserves, one feeds additional network traffic into the existing network. The Traffic Generator generates this user-defined additional traffic. During this test, it is possible to observe critical parameters and to measure the changes of the application behaviour. The example shows the behaviour of a LON network which consists of the Traffic Generator and other nodes. Two of these nodes cause a heavy network traffic by transmitting unacknowledged messages between each other. Figure 6 shows the test result. There are fewer and fewer packets which arrive at the receiver node if the generated traffic is increased. This test allows planning under safe conditions. It avoids bad investment in components which do not fit the requirements.

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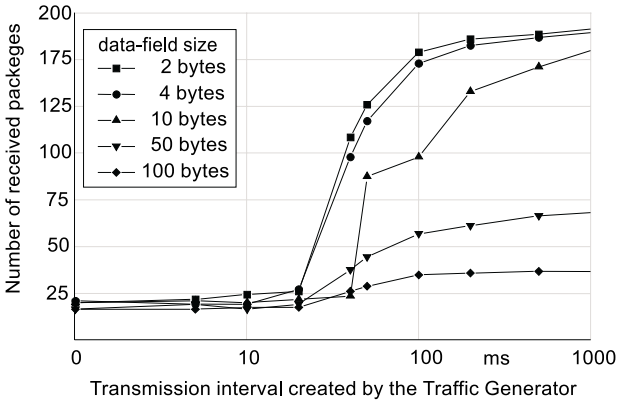

Figure 6: Packet transmission test in a stressed network

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Company	Contact Person	Post-code	Town/City	Telephone	Fax	Email	Short Description
Handwerkskammer Südthüringen, BTZ Rohr-Kloster	Dr. Becker	98530	Rohr	036844-470	036844-40208	BTZ-Rohr.Becker@t-online.de	Syndicate, Educational establishment
Heimeier GmbH & Co. KG	Kasprik	59597	Erwitte	02943-891296	02943-8919296	stefan.kasprik@heimeier.com	
Helvar GmbH	Sommer	63322	Rödermark	06074-9209-0	06074-9209-23	ingo.sommer@de.helvar.com	Lighting technology
Hermos Informatik GmbH	Fichtner	95490	Mistelgau	09279-991550	09279-991100	harald.buchmann@hermos.com	Information and communication management
HGA Haus- und Gebäudeautomation	Troppmair	4490	St. Florian	0043-7224-20022	0043-7224-2002220	ofice.hga@aon.at	
HGI - Heger Gebäudeautomation Ing. GmbH	Heger	48477	Hörstel	05459-80170	05459-8017333	heger@hgi.de	System Integrator building
HNC Controlling Networks	Holzapfel	35756	Mittenaar	02778-919000	02778-919009	hncgmbh@t-online.de	Single room management
Honeywell AG	Müller	63067	Offenbach	06181-401907	06181-401553	Christian.Muellerhoneywell.com	Building automation
Hüppe Form Sonnenschutzsysteme GmbH	Farrenkopf	26133	Oldenburg	0441-402-423	0441-402-514	cfarrenkopf@hueppeform.de	Sun protection systems
HWS Control Systems GmbH	Wenzel	99099	Erfurt	0361-44214-11	0361-44214-30	martin.wenzel@hwse.hoerburger.de	Building automation, System Integrator
HYGROTEC GmbH	Friedrich	79822	Titisee-Neustadt	07669-9210-11	07669-9210-13	hygrotec@aol.com	Industrial measurement technology
ICON AG	Fritz	55765	Birkenfeld	06782-9954-0	06782-9954-15	mail@intelligent-control.com	Components for building systems technology
ICT TU Wien	Dr. Dietrich	1040	Wien	0043-1-5880138410	0043-1-5880138499	dietrich@ict.tuwien.ac.at	Multi-Vendor-Systems, Training, Research
IfR Regelungstechnik GmbH	Schaefe	12161	Berlin	030-859093-0	030-8523822	hschaefe@ifr-regelungstechnik.de	
INGA GmbH	Gebhardt	31785	Hameln	05151-9451-34	05151-21202	ge@inga-hameln.de	System Integrator, Building control technology, Visualisation
Ing.-Büro für Beratung im Holzsystembau	Meyer	53225	Bonn	0228-9738380	0228-9738381	wm@meyer-holzsystembau.de	Consulting, Training, Product & project management
Ingenieurbüro Fulst	Fulst	38690	Vienenburg	05324-7799-0	05324-7799-99	ibfulst@t-online.de	Planning in building automation
Ingenieurbüro Ostendorf	Oudemaat	49477	Ibbenbüren	05451-45031	05451-45033		Building control technology
Ingenieurgruppe München eG	Seibt	81667	München	089-459915-49	089-459915-11	seibt@igmuc.de	System Integrator
Innung für Elekro- und Informationstechnik	Pfeiffer	90439	Nürnberg	0911-270527	0911-268265	elektroinnung-nbg-fue@cco.de	Representation of interests, training
INTRON GmbH & Co. KG	Rentergent	41379	Brüggen	02163-953000	02163-59844		Tailor-made applications
IPC-Scope GmbH	Bauer	63322	Rödermark	06074-910650	06074-91065-15	IPC-GmbH@t-online.de	Planning office, electrical engineering technology
IPP GmbH	Hoffmann	66773	Schwalbach	06834-95670	06834-956710	p.hoffmann@ipp-gmbh.de	
IPS GmbH	Werner	66740	Saarlouis	06831-8906100	06831-8906159	d.werner@ips-koch.de	
J&K Regeltechnik	Jendrzejzyk	82319	Starnberg	08151-918990	08151-918992	info@JK-Regeltechnik.de	Measurement, control & regulation technology, System Integrator
Johnson Controls JCI Regelungstechnik GmbH	Schluckebier	45143	Essen	0201-24003-67	0201-24003-58	wilhelm.schluckebier@jci.com	Building control technology
Kaba Benzing GmbH	Guttmann	78056	VS-Schweninngen	07720-6031-56	07720-6031-85	rguttmann@kbs.kaba.com	Access control, identification, Value card systems

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Company	Contact Person	Post-code	Town/City	Telephone	Fax	Email	Short Description
KEA Gebäude- und Elektrotechnik GmbH	Khim	76707	Hambrücken	07255-9794	07255-4456	jochen.khim@kea-net.de	
Kessler & Luch GmbH & Co. KG	Welskop	35394	Gießen	0641-707467	0641-707210	joerg.welskop@kesslerluch.de	
Kieback & Peter GmbH & Co. KG	Alisch	12247	Berlin	030-60095-510	030-60095-540	kieback@aol.com	Building automation
KIMO Antriebstechnik	Dr. Gibson	91058	Erlangen	09131-6069-37	09131-6069-35	gibson.woelfl@t-online.de	Rotation speed regulators for ventilators, pumps, compressors etc.
Knestel Elektronik GmbH	Hank	87496	Hopferbach	08372-708-44	08372-2384	juergen.hank@knestel.de	Process automation, Measuring technology
Kriwan Industrieelektronik GmbH	Leja	74670	Forchtenberg	07947-82269	07947-7122	christoph.leja@kriwan.de	Customer specific solutions, refrigeration technology
KSB AG	Mewes	91257	Pegnitz	09241-711220	09241-711793	frank.mewes@ksbgroup.com	Building automation
KT-Elektronik GmbH	Bräutigam	12165	Berlin	030-7908050	030-790805-20	kt.lon@kt-elektronik.de	
Lampe & Martens GmbH & Co. KG	Martens	49681	Garrel	04474-94150	04474-941515	info@lampe-martens.de	Building automation
Landis & Staefa GmbH	Kissel	60388	Frankfurt	069-4002-1688	069-4002-1649	markus.kissel@de.sibt.com	Building automation
läufer fernwirktechnik GmbH	Stemmann	45277	Essen	0201-85800-33	0201-85800-85	j.stemmann@laeufer-fernwirktechnik.de	Remote access technology
Lippok & Wolf GmbH	Hörz	73642	Welzheim	07182-93660-33	07182-93660-9	j.hoerz@liwo.com	
Littwin GmbH	Littwin jr.	26125	Oldenburg	0441-96099-0	0441-96099-50	j.littwin@littwin.de	Remote access technology
MK Control Systems GmbH	Mentzel	42277	Wuppertal	0202-2629410	0202-2629430	mmentzel@mentzel-krutmann.de	Soft and hardware products, System Integrator
Moeller ElectroniX, Zweigniederlassung der Moeller GmbH, Bonn	Knafla	32758	Detmold	05231-9481-165	05231-9481-514	frank.knafla@moeller.net	Building automation
MSR Elektronik	Kuhn	09212	Limbach-Oberfrohna	03722-93573	03722-98197	kuhnmsr@aol.com	System Integrator
MSR Technik GmbH	Schützeneder	94060	Pocking	08531-900449	08531-900444	info@msr-technik.de	Measurement, control & regulation technology
Nicolay Hard- und Softwareentwicklung	Nicolay	42553	Velbert	02053-504300	02053-504301	nicolay.entw@t-online.de	
Nixdorf Institut Uni Paderborn	Dr. Rüping	33102	Paderborn	05251-606-352	05251-606-351	rueping@hni.uni-paderborn.de	R&D, Hardware, Building automation
Nodus GmbH	Frank	21079	Hamburg	040-7679660	040-76796670	th.f@nodus-online.de	Energy Control System
NV Connection	Hoyer	40766	Fürth	0911-9748308	0911-9748309	hoyer@nv-connection.de	Systemintegrator
Oppermann Regelgeräte GmbH	Oppermann	70567	Stuttgart	0711-727235-60	0711-7280527	oppermann@opperman-regelgeraete.de	Sensors +Actuators for Air and fire protection
PALUX AG	Herrmann	97980	Bad Mergentheim	07931-55-101	07931-55-291	rainer.hermann@palux.de	Gastronomy technology
PASStec Industrieelektronik GmbH	Penzel	08451	Crimmitschau	03762-9566200	03762-9566111	penzel@passtec.de	
pbe engeneering GmbH gesellschaft für integrierte gebäudeautomation	Ecker	12205	Berlin	030-843884-0	030-843884-29	ecker@m-e.de	Planning, Engineering, Surveying
Pfänder Automatisierungstechnik GmbH	Pfänder	74585	Hausen am Bach	07958-9800-10	07958-9800-50	pfaender_gmbh@t-online.de	Automation technology
Philips Licht UB der Philips GmbH	Forth	14165	Berlin	030-80906728	030-80906729	helmut.forth@philips.com	Lighting management systems
Plüth Energietechnik	Beckmann	48432	Rheine	05971-96630	05971-966399	info@plueth.net	Building automation, System integrator, Tools
Popp GmbH & Co. KG	Makedon	95460	Bad Berneck	09273-73-138	09273-199	andreas.makedon@popp-elektro.de	

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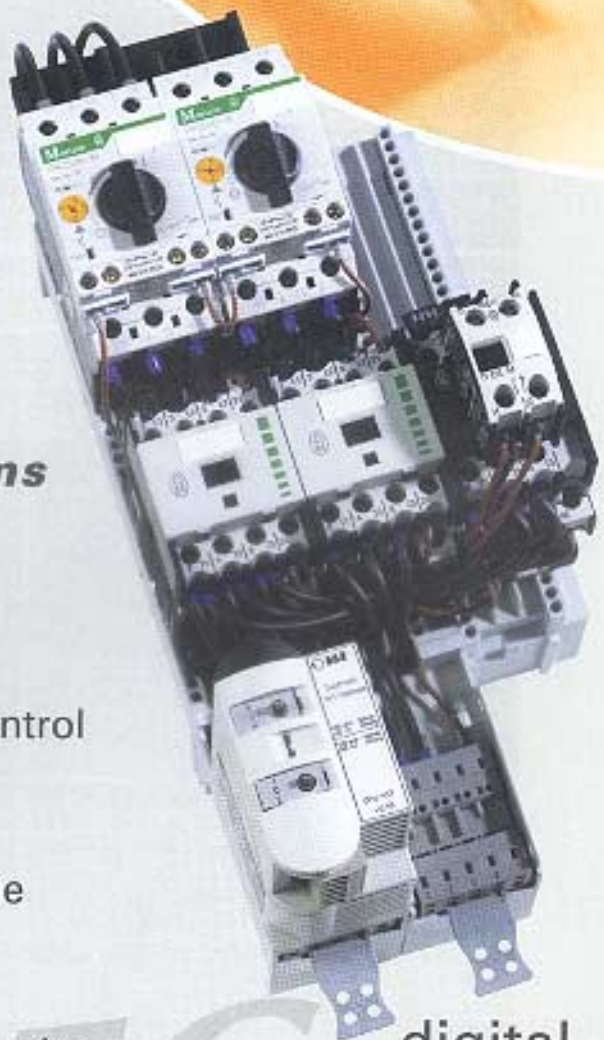

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Pulsotronic Merten GmbH & Co KG	Jeschke	51674	Wiehl	02261-702382	02261-7026382	henry_jeschke@merten.de	
RACOM GmbH	Raffke	91301	Forchheim	09191-640525	09191-640526	racom@t-online.de	Intelligent home technology
REGULEX Automation GmbH	Mayer	82049	Pullach	089-744301-0	089-744301-20	info@regulex.de	System Integrator, Development systems
REKO electronic GmbH	Schüll	97828	Marktheidenfeld	09391-209650	09391-209789	ekkehard.schuell@reko-electronic.de	Daylight system technology
Romutec Steuer- und Regelsysteme GmbH	Muss	91592	Buch am Wald	09867-97900	09867-979090	info@romutec.de	Manual-emergency control level for mounting rails
RSM-Technik GmbH	Zepmeisel	82041	Oberhaching	089-66665911	089-66665912	info@rsm-technik.de	Regulation, control and module technology
SAIA-Burgess Electronics GmbH & Co. (Germany) KG	Stauffenberg	63303	Dreieich	06103-8906-48	06103-8906-65	r.stauffenberg@t-online.de	
Schneider Elektronik GmbH	Bufé	61191	Rosbach	06007-2044	06007-1842	Rainer.Bufe@Schneider-Elektronik.de	Measurement, control & regulation technology, air technology for laboratories
SecuTec GmbH	Sohns	64560	Riedstadt-Goddelau	06158-1886701	06158-1886707	secutec1@aol.com	Smoke, warmth and outlet equipment, Climate control
S.E.S.Seipp Energiemanagement Systeme	Seipp	36304	Alsfeld	06631-73889	06631-71952	u.seipp@t-online.de	
SICOTRONIC GmbH	Gruber	81927	München	089-95700-46	089-95700-48	gruber@sicotronic.de	Energy management systems, Elektronics for building automation
Siganet	Jiresch	49479	Ibbenbüren	05451-5901352	05451-5901350	leonhard.jiresch@siganet.de	Planning office for building automation
SOMFY GmbH	Keller	12277	Berlin	030-7239080	030-7035015	thomas.keller@somfy.com	Automatics for blinds & sun protection
Spelsberg Gebäudeautomation	Spelsberg	47057	Duisburg	0203-3061700	0203-3061749	jsp@spega.de	System supplier for the intelligent home
STG Beikirch GmbH	Wehking	32657	Lemgo	05261-965887	05261-965866	info@stg-beikirch.de	
Störk-Tronic GmbH & Co.	Holzaepfel	70569	Stuttgart	0711-68661-0	0711-68661-44	info@stoerk-tronic.com	Measurement, control & regulation technology, Refrigeration technology
SVEA GmbH & Co.	Kühne	22303	Hamburg	040-27856650	040-27856699	bcs@svea.de	System Integrator for buildings
SysMik GmbH Dresden	Dr. Vack	01309	Dresden	0351-43358-10	0351-43358-19	guvack@sysmik.de	System Integrator, Development tools
Systron GmbH	Schmall	12489	Berlin	030-639236-37	030-639236-33	systron-berlin@t-online.de	
TAC GmbH Control Systems	Dornhöfer	46047	Oberhausen	0208-82486-0	0208-82486-10	wodo@tacd.de	Building control systems
TECTROL GmbH	Kremer-Merseburg	47804	Krefeld	02151-728083	02151-728099	hkremer@tectrol.de	PLC-Systems, Tailor-made solutions
TEMA Technologie Marketing	Bleimann-Gather	52064	Aachen	0241-88970-0	0241-8897042	info@tema.de	Marketing, Press work, Events
Thermokon Sensortechnik GmbH	Debus	35756	Mittenaar	02772-6501-0	02772-6501-400	debus@thermokon.de	Temperature sensing device, Room control device, Multi-sensors, IO-Modules
TLON GmbH	Gaukel	74523	Schwäbisch-Hall	0791-93050-0	0791-93050-50	gaukel@tlon.de	System Integrator, Multi-Chip-Module
TORMAX Alps	Hüsler	8180	Bülach (ZH)	0041-1-8635459	0041-1-8635475	urs.huesler@landert.com	Door automation
Toshiba Electronics Europe GmbH	Juttner	40549	Düsseldorf	0211-5296-202	0211-5296-404	mjuttner@tee.toshiba.de	Semi-conductor manufacturing, ASCIs
TU Dresden Fak. Informatik	Prof. Dr. Kabitzsch	01062	Dresden	0351-4638-289	0351-4638-460	kabitzsch@iis.inf.tu-dresden.de	Research
Unitro-Fleischmann	Fleischmann	71522	Backnang	07191-141-117	07191-141-299	h.fleischmann@unitro.de	analog+digital I/O-Modules, Repeaters, Routers PL+Radio

Membership List, LNO Germany

Company	Contact Person	Post-code	Town/City	Telephone	Fax	Email	Short Description
Vescon Systemtechnik GmbH	Olbrych	8160	Welz	0043-3172-446560	0043-3172-4465688	j.olbrych@wz.vescon.com	
Vestamatic Benelux bv	Thomissen	6430	AA Hoensbroek	0031-45-5280270	0031-45-5280279	richard.thomissen@vestamatic.nl	
Viessmann Werke GmbH & Co.	Dr. Daffner	35107	Allendorf/Eder	06452-70-0	06452-70-2780		Heating regulation
WAGO Kontakttechnik GmbH	Kohde	32423	Minden	0571-887-528	0571-887-8528	info@wagotoplon.com	Components for building technology / building automation
Walther Werke GmbH	Frenger	67304	Eisenberg	06351-75222	06351-75227	manfred.frenger@walther-werke.de	Production for building technology, Electrical installation, Industry
who Ingenieurgesellschaft mbH	Woock	23556	Lübeck	0451-8818900	0451-8818929	woock@who-ing.de	System Integrator, Hardware and software development
Wieland Electric GmbH	Hiltscher	96052	Bamberg	0951-9324-138	0951-9324-447	alfons.hiltscher@wieland-electric.com	Electrical connections
Wonderware GmbH	Kura	41460	Neuss	02131-5685145	02131-5685100	gero.kura@wonderware.com	Automation software
Ziehl-Abegg GmbH & Co. KG	Albig	74653	Künzelsau	07940-16-322	07940-16-300	juergen.albig@ziehl-abegg.de	Ventilators, External rotor motor

Membership List, LNO Austria

Company	Name	Tel:	Postcode/Zip	Town/City	Street
Albrecht Elektrotechnik GmbH & Co	Peter Albrecht	0732/795333	A-4020	Linz	Prinz Eugen Str. 21
EAE-Stöckl GesmbH	Roland Fleissner	0512-33550-13	A-6020	Innsbruck	Griesauweg 30
Echelon BV	Henny Van de Bovenkamp	0031-33-4504070	NL-3821 AP	Amersfoort	Printerweg 3
Eder Technisches Büro - LON Engineering	Ernst Eder	06412-69 78 oder 07587-76 48 1	A-5600	St. Johann/Pg	H. Kappacherstrasse 24
GMC-Instruments GmbH	Manfred Prelak	01-715 15 00	A-1033	Wien	OB. Viaduktgasse 28
HGA GmbH	Michael Troppmair	07224/20022-12	A-4490	St. Florian	Pummerinplatz 1
Hölzl Gebäudesystem- und Bustechnik	Hansjörg Hölzl	05356-666 44-0	A-6370	Reith/ Kitzbühel	Dorf 429
Honeywell Austria GmbH	Ludwig Kastner	01-727 80-201	A-1020	Wien	Handelskai 388
HTC Kral	Christian Kral	01-810 02 69	A-1120	Wien	Malfattigasse 1/2/1
Huter Energiekontrollsysteme	Roman Huter	05417-6300	A-6426	Roppen	Unterfeld 299
iku-intelligente Fenstersysteme AG	Monika Thurnher	01-616 56 58-39	A-1232	Wien	Slamastraße 25-27
Kieback & Peter Regeltechnik GmbH	J. Heiligenbrunner	01-258 44 72-12	A-1210	Wien	Ignaz-Köck-Straße 9
Loytec	Hans Jörg Schweinzer	0676-3251301	A-1220	Wien	Siebenbürgerstrasse 23
Morscher Microprocessor-Team KEG	Jürgen Morscher	01-505 42 50	A-1040	Wien	Südtirolerplatz 8/19
Philips Licht GmbH	Franz Josef Müller	01-601 01-1369	A-1101	Wien	Triester Straße 64
Somfy	Kurt Grün	0662-6253080	A-5061	Elsbethen Glasenbach	Johann Herbst Straße 23
Thermokon	Siegfried Gaida	02266-67 485-13	A-2000	Stockerau	Ernstbrunner Straße 31
Tibeg	Franz Putz	07673-3975-0	A-4690	Schwanenstadt	Höck 29
TIWAG Tiroler Wasserkraftwerke AG	Josef Geiger	0512-506-2148	A-6010	Innsbruck	Eduard Wallnöfer Platz 2
TU Wien/ICT Inst. f. Computertechn.	Dietmar Dietrich	01-588 01-38410	A-1040	Wien	Gußhausstraße 27-29

LON NUTZER ORGANISATION e.V.

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(please separate and post or fax to:
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Tel. (+49) (0) 241-88970-0, Fax. (+49) (0) 241-88970-42.
We will gladly send you, upon request, the organisation's statutes)

We hereby apply for admission as a member of the LON Nutzer Organisation e.V. (LON User Organisation)

Company

Contact Person

Address

Telephone Fax e-mail

Branches:

☐ Industrial automation	☐ Planner / Architect
☐ Building automation	☐ System integration
☐ Gastronomy technology	☐ Tools / Product development
☐ Refrigeration / Air Conditioning	☐ Other

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Entry Group	Valid for	Yearly fee
E	Companies up to 10 employees	1,000 DM
D	Companies over 10 employees	2,000 DM
C	Companies over 50 employees	3,000 DM
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A	Companies over 1,000 employees	10,000 DM
G	Students	100 DM
F	Non-profit making institutes and individual people	500 DM

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- ☐ Participation at a joint LONWORKS booth at the Hanover Fair / ISH / light+building
- ☐ *Publications / Advertisement placement in the LNO Brief*
- ☐ *Participation in the Task Groups*
- ☐ Entry of our products in the online product data base of the LNO
- ☐ Promotion material / Books about LONWORKS at reduced prices

Fax-Reply (+49) (0)241-88970-42

LNO-Brief European edition No 1, April 2001

Sender

_____
Surname First Name

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Company

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Address

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Tel. Fax

An

LNO-Sekretariat
c/o TEMA
Theaterstr. 74
52062 Aachen

Tel. 02 41 - 88 97 0-0
Fax 02 41 - 88 97 0-42

Please send me:

- ❑ Infos about the LON Nutzer Organisation e.V. / LON Users Organisation (LNO)
- ❑ General Infos about LonWorks-Technology
- ❑ I would like to become a member. Membership request form on p. 72
- ❑ Please telephone me!

Please send me further infos about the article
(The LNO will forward your address to the corresponding manufacturer who will then send you information material)

■ Introduction to LonWorks technology

- ❑ LonWorks Essentials for the Novice Reader
- ❑ LonWorks casts its "net" to industrial applications
- ❑ What is the LNO?
- ❑ LonWorks in Industrial Control
- ❑ Interview with Henk Walraven
- ❑ The LonMark Interoperability Association

■ Reference Projects

- ❑ Sanacorp Pharmahandel AG Project, Ulm, Germany
- ❑ New Depfa Bank Building Project
- ❑ Rudolph Diesel School Project, Waldkraiburg, Germany
- ❑ LonWorks in Bratislava Bank
- ❑ Door Management System
- ❑ Central Seine Building – Van Gogh
- ❑ Maersk Data's new headquarters
- ❑ Helsinki story: LON connection of churches
- ❑ Heavenly Building Technology
- ❑ LonMark Around Europe

■ Applications and Products

- ❑ DRAKALON®: The No. 1 cabling system for LonWorks Networks
- ❑ GLOBE 2000
- ❑ Motor driven valve actuator - The economic solution
- ❑ New dimension in room management
- ❑ Gipsy Makes Buildings Communicate
- ❑ Diagnosis Tool Detects Any Problem within LON Network
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- ❑ Membership List
- ❑ Membership Request Form
- ❑ Fax-Antwort
- ❑ Fairs and Events

Events at which the LNO will be participating

Hannover Messe / Hanover Fair
Hanover, 23 -28 April 2001, Booth A 68, Hall 9 – Automation Hall
The LNO will be present at this year's Hanover Fair with 31 international companies and institutes. The whole range of LonWorks technology will be presented with a particular focus on LonWorks in industry.
Contact: Ms Sylvia Braunleder, LNO-Sekretariat, Tel. (+49) (0) 241-88970-0, Email braunleder@tema.de. You will find more detailed information about the fair at: www.hannovermesse.de.

IKK 2001 (internationale Fachmesse für Kälte, Klima und Lüftung)
Hanover, 10 - 12 October 2001
The IKK - Internationale Fachmesse für Kälte, Klima, Lüftung (International Trade Fair for Cooling, Air Conditioning and Ventilation) is taking place this year for the first time in Hanover. The LNO will again exhibit at a joint LonWorks booth under the motto "LonWorks in Practice: Cooling and Air-Conditioning"
The participation fee (incl. the usual TEMA Full Service Package) is:
For LNO members: DM 4,800 (plus VAT@16%), for non-LNO Members: DM 5,600 (plus VAT @ 16%).
Contact: Ms Andrea Böttcher, LNO-Sekretariat, Tel. (+49) (0) 241-88970-58, Email boettcher@tema.de. You will find more detailed information about the fair at: www.ikk.info-web.de.

LonWorld ™ 2001
Frankfurt, 23 - 24 October 2001
The world's only show with an exclusive focus on the LonWorks Platform will take place this year in Frankfurt, Germany.

Seeking participants at a possible joint LNO booth

IFA Internationale Funkausstellung Berlin "die e/ home stellt sich vor"

Berlin, 25 August – 2 September 2001
Under the motto "e/home introduces itself", the Messe Berlin (Berlin Fair) will cover the topic "Networking techniques in private living areas" at the IFA - Internationale Funkausstellung Berlin (International Radio Show Berlin) and will offer a meeting point for trade and industry in a dedicated exhibition area.

TEMA AG has made an offer for a joint LonWorks booth.
Contact: Ms Andrea Böttcher, Tel. (+49) (0) 241-88970-58, Email boettcher@tema.de

Elektrotechnik
Dortmund, 5 - 8 September 2001
The focus of this year's event is measurement, monitoring and control technology, energy supply, building system technology and industrial electronics. It is mainly aimed at the electrical engineering industry, energy providers and architects / consulting engineers.
If there is sufficient interest, a joint LonWorks booth will be organised.
Contact: Ms Martina Rojano, Tel.: (+49) (0) 241-88970-56, Email: rojano@tema.de

EXPOREAL
Munich, 29 - 31 October 2001
The EXPOREAL counts as the leading central European fair for industrial real estate. The fair is marked by a strong presence on the part of project developers, investors, real-estate consultants, banks, economic regions, as well as facility managers, architects and service providers concerned with real estate.
TEMA AG has made an offer for a joint LonWorks booth.
Contact: Ms Andrea Böttcher, Tel. 0241-88970-58, Email boettcher@tema.de. Further information about the fair: www.exporeal.de.

SPS/IPC/DRIVES 2001
Nuremberg, 27 - 29 November 2001
The fair for electrical automation technology.
TEMA AG has made an offer for a joint LonWorks booth.
Contact: Ms Andrea Böttcher, Tel. (+49) (0) 241-88970-58, Email boettcher@tema.de

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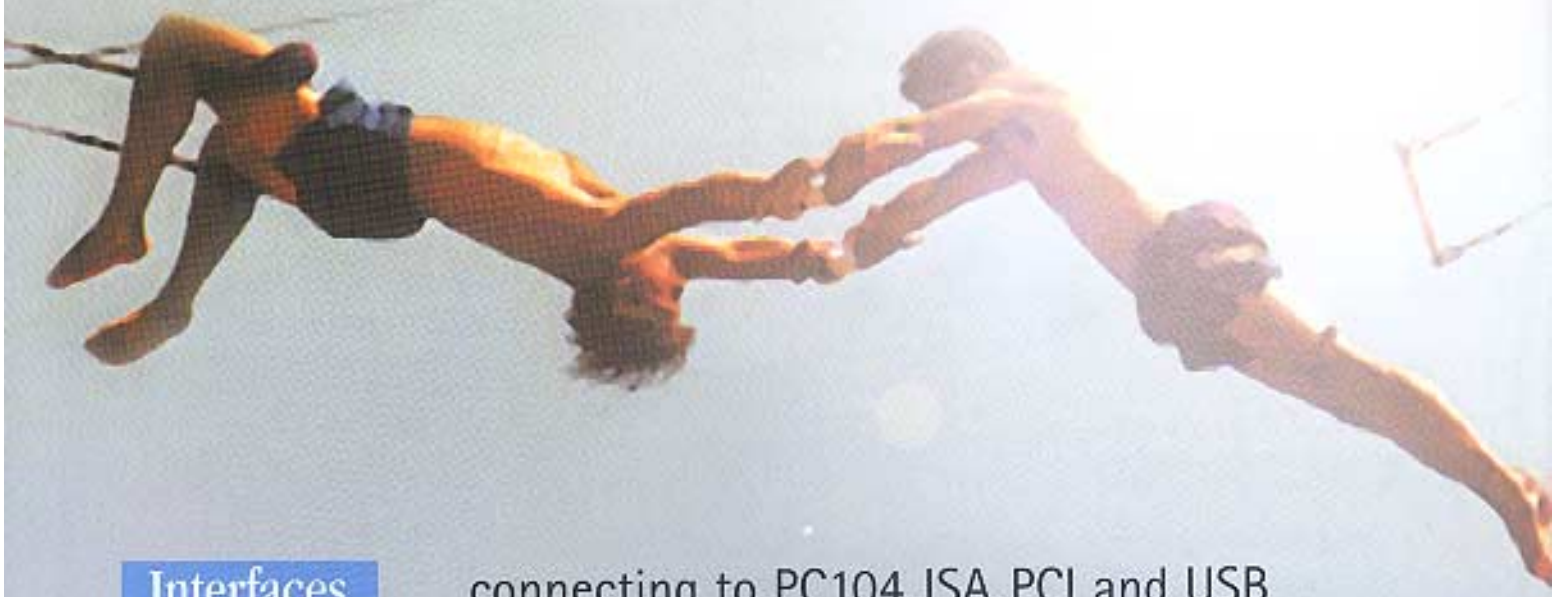

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